

OWNER'S Manual

8 kW

AIR-COOLED HOME STANDBY GENERATOR

Model No. 9067-0

GENERAC

SAFETY RULES

Study these SAFETY RULES carefully before installing, operating or servicing this equipment. Become familiar with the Owner's Manual and with the generator. Safe, efficient and reliable operation can be obtained only if the generator is properly installed, operated and maintained. Many accidents are caused by a failure to follow simple and fundamental rules.

Generac cannot possibly anticipate every possible circumstance that might involve a hazard. The warnings in this Manual and on tags and decals affixed to the equipment are therefore not all-inclusive. If a procedure, work method or operating technique not specifically recommended by Generac is used, you must satisfy yourself that it is safe for you and others. You must also make sure the generator will not be damaged or rendered unsafe by the procedure, work method or operating technique you have chosen.

Generac suggests that these SAFETY RULES be copied and posted near the standby electric system installation. SAFETY SHOULD BE STRESSED TO ALL OPERATORS AND POTENTIAL OPERATORS OF THIS EQUIPMENT.

1 For fire safety, this equipment must be properly installed and maintained. Installation must always remain in compliance with applicable codes, standards, laws and regulations. Local, state and national electrical and building codes must be strictly adhered to. Regulations established by the Occupational Safety and Health Administration (OSHA) must be complied with. In addition, the generator and related components must be installed completely in conformance with the manufacturer's instructions and recommendations. Following proper installation, nothing must be done that might alter such safe installation and render it in non-compliance with such codes, standards, laws and regulations.

2 Do not smoke around the generator. Wipe up all fuel and oil spills immediately. Do not leave oily rags in the generator compartment. Keep the area around the generator clean and free of debris.

3 An adequate unobstructed flow of cooling and ventilating air is required for cooling, expelling toxic and flammable fumes, and engine combustion. Do not alter the installation or permit cooling and ventilation openings in the generator compartment to become obstructed. The generator MUST be installed outdoors.

4 The engine exhaust system gives off DEADLY carbon monoxide gas. This dangerous gas, if breathed in sufficient concentrations, can cause unconsciousness or even death. Inspect the exhaust system frequently. There must be no possibility of exhaust fumes entering any building or room occupied by people or animals. The generator MUST be installed outdoors, where adequate ventilation is available.

5 Keep hands, feet, clothing, etc., away from drive belts, fans and other moving parts.

6 The National Electric Code requires that the frame and external electrically conductive parts of the generator be properly connected to an approved earth ground. Local electrical codes may also require proper grounding of the generator. Proper grounding will help prevent electrical shock in the event of a ground fault condition.

7 When installation of this home standby electrical system is complete, the generator engine may crank and start at any time without warning. Following startup, transfer of load circuits to the STANDBY (Generator) power source will occur. To prevent possible injury that might be caused by such sudden startup and transfer, always set the generator's Manual/Off/Auto switch to its OFF position before working on equipment.

8 Extremely high and dangerous voltages are delivered to the transfer switch from the UTILITY power source and from the standby generator, when the latter is running. Contact with bare wires, terminals, connections, etc. can result in very hazardous, and possibly LETHAL electrical shock.

9 When working on this equipment, remain alert at all times. Never work on the equipment when physically or mentally fatigued.

10 Never handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. DANGEROUS ELECTRICAL SHOCK WILL RESULT.

11 In case of accident caused by electrical shock, shut the source of electrical power down at once. If this cannot be done, free the victim from the live conductor. AVOID DIRECT CONTACT WITH THE VICTIM. Use a dry board, dry rope, or other non-conducting implement to free the victim from the live conductor. If victim is unconscious, apply CPR (cardio-pulmonary-resuscitation) and get medical help.

12 Gaseous fuels such as natural and LP (propane) gas are extremely EXPLOSIVE. The fuel supply system must be properly installed in accordance with applicable fuel-gas codes. Before placing the home standby electric system into service, the fuel system lines must be properly purged and leak tested in accordance with applicable code. Following installation, the fuel system must be inspected periodically for leaks. No leakage is permitted.

13 Inspect the home standby system periodically. Repair or replace all damaged or defective parts immediately.

14 Keep a fire extinguisher on hand near the generator. Set Extinguishers rated "ABC" by the National Fire Protection Association are appropriate for use with the standby electric system. Keep the extinguisher properly charged and be familiar with its use. If you have any questions pertaining to fire extinguishers, consult your local fire department.

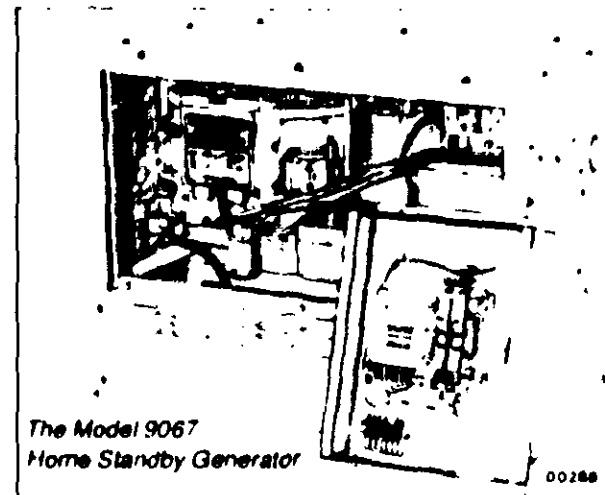
15 Never wear jewelry while working on this equipment. Jewelry conducts electricity and can cause dangerous electrical shock.

DANGER! DESPITE THE SAFE DESIGN OF THE GENERATOR AND TRANSFER SWITCH, OPERATING THESE DEVICES IMPRUDENTLY, NEGLECTING THEIR MAINTENANCE, OR CARELESSNESS CAN CAUSE POSSIBLE INJURY OR DEATH. THE GENERATOR IS POWERFUL ENOUGH TO DELIVER A FATAL ELECTRICAL SHOCK. UTILITY POWER SOURCE VOLTAGE DELIVERED TO THE TRANSFER SWITCH CAN ALSO CAUSE FATAL ELECTRICAL SHOCK. ONLY RESPONSIBLE AND CAPABLE PERSONS SHOULD BE PERMITTED TO OPERATE OR MAINTAIN THIS EQUIPMENT.

TABLE OF CONTENTS

	Page		Page
GENERAL INFORMATION		ADJUSTMENTS	
Introduction	3	General	16
Safety	3	Gaseous Fuel Load Block Adjustment	16
Equipment Description	3	Engine Governor Adjustment	17
Engine-Generator Drive System	3	Voltage Regulator Adjustment	17
Accessories	3		
Testing Policy	3	PROTECTIVE SYSTEMS AND DEVICES	
SPECIFICATIONS		General	18
Generator Specifications	5	Oil Makeup System	18
Engine Specifications	5	Low Oil Pressure Shutdown	18
Fuel Requirements	5	High Temperature Shutdown	18
Generator Lubrication	5	Overvoltage Protection	18
Engine Lubrication	5	Field Boost	18
INSTALLATION REQUIREMENTS		TROUBLESHOOTING CHART	19
General	5	GENERATOR WIRING DIAGRAM	20
Prior to Installation	6	TRANSFER SWITCH WIRING DIAGRAM	21
Standards Index	6	ELECTRICAL FORMULAS	32
Planning the Installation	6	REPAIR PARTS	
Generator and Transfer Switch Location	7	Exploded View of Generator	22
Generator Mounting and Support	7	Exploded View of Transfer Switch	23
Transfer Switch Mounting	7	Base and Pulleys	24
Natural and LP Gas Fuel System Installation	7	Home Standby Enclosure	26
The Generator a-c Connection System	8	Engine Enclosure	28
Wiring Interconnections	8	Natural Gas Carburetor	30
Grounding the Generator	9	Control Panel	31
Control System Interconnections	9	Exploded View of V-Twin Engine	32
Battery Installation	9		
Post Installation Inspection	10	LIST OF ILLUSTRATIONS	
POST INSTALLATION TESTS		The Model 9067 Home Standby Generator	3
General	10	Generator and Transfer Switch Dimensions	4
Preparation Before Initial Startup	10	Figure 1 A Typical Home Standby Electrical System	6
Transfer Switch Manual Operation	10	Figure 2 Mount Generator to a Cement Slab	7
Transfer Switch Electrical Tests	11	Figure 3 The Generator Fuel System	8
Generator Tests Under Load	11	Figure 4 Home Standby System Interconnection Diagram (Drawing No. 74106)	8
OPERATION		Figure 5 The Generator a-c Connection System	9
Using the Manual-Off-Auto Switch	12	Figure 6 Grounding the Generator	9
To Select Automatic Operation	12	Figure 7 Battery Cable Connections	10
Sequence of Automatic Operation	12	Figure 8 Transfer Switch Manual Operation	11
Weekly Exercise Cycle	12	Figure 9 Control Logic Circuit Board (Set Exercise)	13
Effects of Moisture and Dirt on Generators	13	Figure 10 Generator Control Panel Components	13
Effects of Heat and Cold	13	Figure 11 Engine Oil Dipstick & Fill Tube	14
Cooling Air Requirements	13	Figure 12 Oil Drain Hose	14
MAINTENANCE		Figure 13 Engine Oil Filter	14
15 amp Fuse	13	Figure 14 Engine Air Cleaner Assembly	15
Main Circuit Breaker	13	Figure 15 Generator Load Block Adjustment Points	16
Checking Engine Oil Level	14	Figure 16 Engine Governor Adjustment Points	17
Change Engine Oil	14	Figure 17 Voltage Regulator Adjustment Potentiometer	17
Change Engine Oil Filter	14	Figure 18 Oil Makeup System	18
Service Engine Air Cleaner	14	Figure 19 Low Oil Pressure & High Oil Temperature Switches	18
Inspect Battery	15	Figure 20 Voltage Regulator Input/Output Connections	19
Inspect Cooling System	15	Figure 21 Field Boost Circuit	19
Transfer Switch Maintenance System Inspection	15		

GENERAL INFORMATION



The Model 9067
Home Standby Generator

Equipment Description

This equipment is an engine-driven standby electric power system designed to act as an emergency supplier of electrical power in the event the UTILITY power source has failed or has been reduced to an unacceptable level.

The system includes a standby generator set, enclosed in an all-weather compartment enclosure, as well as a 100 amp transfer switch assembly. When properly installed and interconnected, the system will monitor the UTILITY power supply voltage. Should that source voltage drop below a pre-set value, automatic generator startup and transfer to the STANDBY power source will occur. On restoration of UTILITY source voltage to a pre-set (acceptable) level, re-transfer back to the UTILITY source and generator shutdown will occur.

The generator may be used to operate 120 and/or 240 volts, single phase, 60 Hz, a-c electrical loads requiring up to 8000 watts (8.0 kW) of electrical power. Compatible electrical loads requiring up to 66.7 a-c amperes at 120 volts or up to 33.3 a-c amperes at 240 volts may be powered by the generator.

The transfer switch is rated 100 a-c amperes at up to 250 volts. The transfer switch is intended for indoor installation, usually adjacent to the load distribution panel. It is required by electrical code, to prevent electrical "feedback" between the generator and UTILITY power source.

Engine-Generator Drive System

The generator's revolving field (Rotor) is driven by a twin cylinder engine, through a belt and pulley arrangement at approximately 3600 rpm. The engine is specially designed for low noise level, reduced vibration and long life. It is equipped with a solid state (breakerless) ignition system, cast iron cylinder sleeves, an automatic oil makeup system and automatic engine protective shutdown devices.

NOTE: For information on the oil makeup system and automatic engine protective shutdown devices, refer to **ADDITIONAL INFORMATION** section in this Manual.

Accessories

Included with the generator are (a) a 2 amp Battery Charger, (b) battery rack, and (c) battery cables. A battery is not included with the unit. A 12 volts automotive type storage battery (Group 26), rated 35 amp-hours, is recommended.

Testing Policy

All generators have been factory tested and adjusted using natural gas as the fuel. Units were adjusted for best performance while loaded to their full rated capacity. Output voltage, current and frequency were carefully checked and adjusted.

Rated generator output is based on factory tests of typical units and is subject to and limited by temperature, altitude, fuel and other conditions specified by the engine manufacturer.

Introduction

This Owner's Manual has been prepared especially for the purpose of familiarizing personnel with the design, application, installation, operation and servicing of the applicable equipment. Read the Manual carefully and comply with all instructions. This will help prevent accident or damage to equipment that might otherwise be caused by carelessness, incorrect application, or improper procedures.

Every effort has been expended to ensure that the contents of this Manual are both accurate and current. However, Generac reserves the right to change, alter or otherwise improve the product at any time without prior notice.

Safety

Before installing, operating or servicing this equipment, read the **SAFETY RULES** (Page 1) carefully. All **SAFETY RULES** must be strictly complied with, to prevent accident and/or damage to equipment. In addition to the **SAFETY RULES** in this Manual, be sure to read all instructions and information that might be found on tags, labels and decals affixed to the equipment.

The following definitions apply to **DANGER**, **CAUTION** and **NOTE** blocks found throughout the Manual.

DANGER! AFTER THIS HEADING WILL BE FOUND HANDLING, INSTALLATION, OPERATING AND SERVICING INSTRUCTIONS THAT, IF NOT FULLY COMPLIED WITH, MAY RESULT IN PERSONAL INJURY OR DEATH.

CAUTION! AFTER THIS HEADING WILL BE FOUND HANDLING, INSTALLATION, OPERATING AND SERVICING INSTRUCTIONS THAT, IF NOT STRICTLY COMPLIED WITH, MAY RESULT IN DAMAGE TO EQUIPMENT.

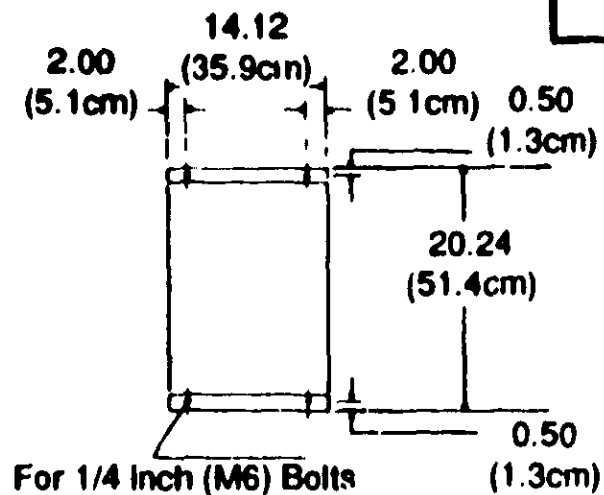
NOTE: After this heading will be found explanatory statements that require special emphasis.

Safety warnings cannot eliminate the hazards they indicate. Strict compliance with these warnings plus common sense are major accident prevention measures.

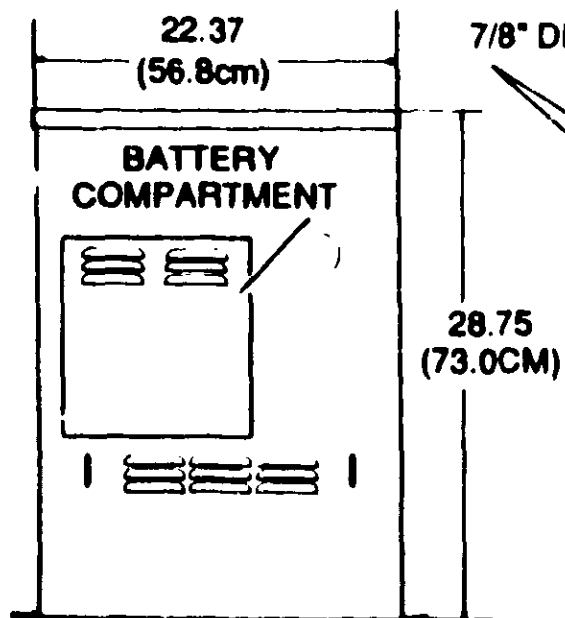
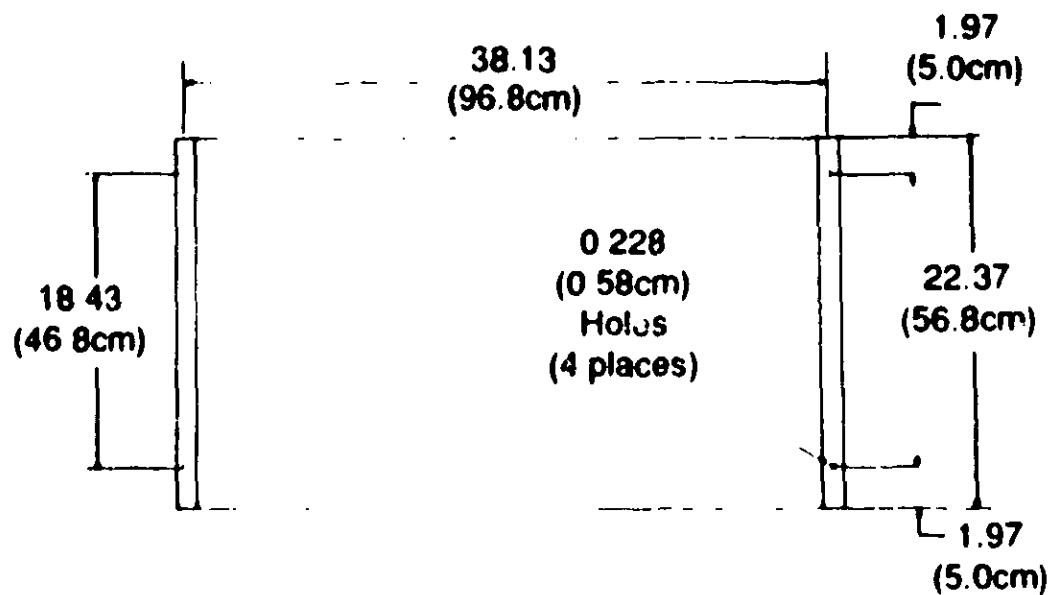
GENERATOR AND TRANSFER SWITCH DIMENSIONS

ALL DIMENSIONS IN INCHES
CENTIMETERS

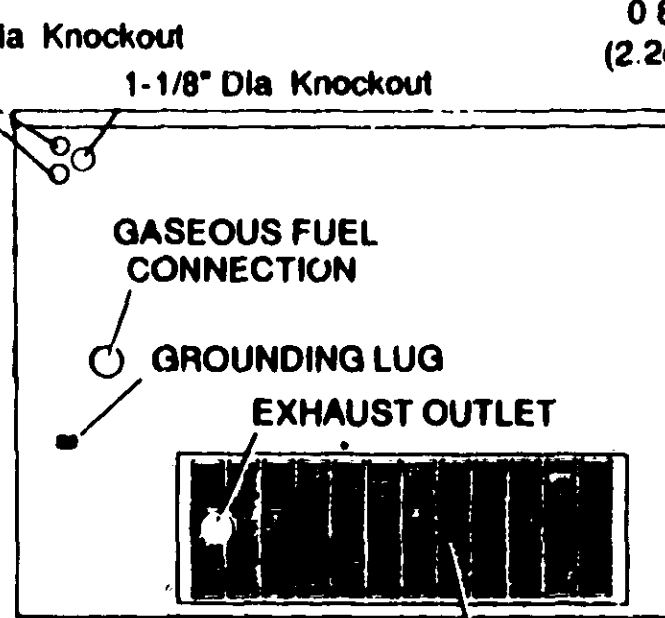
TRANSFER SWITCH



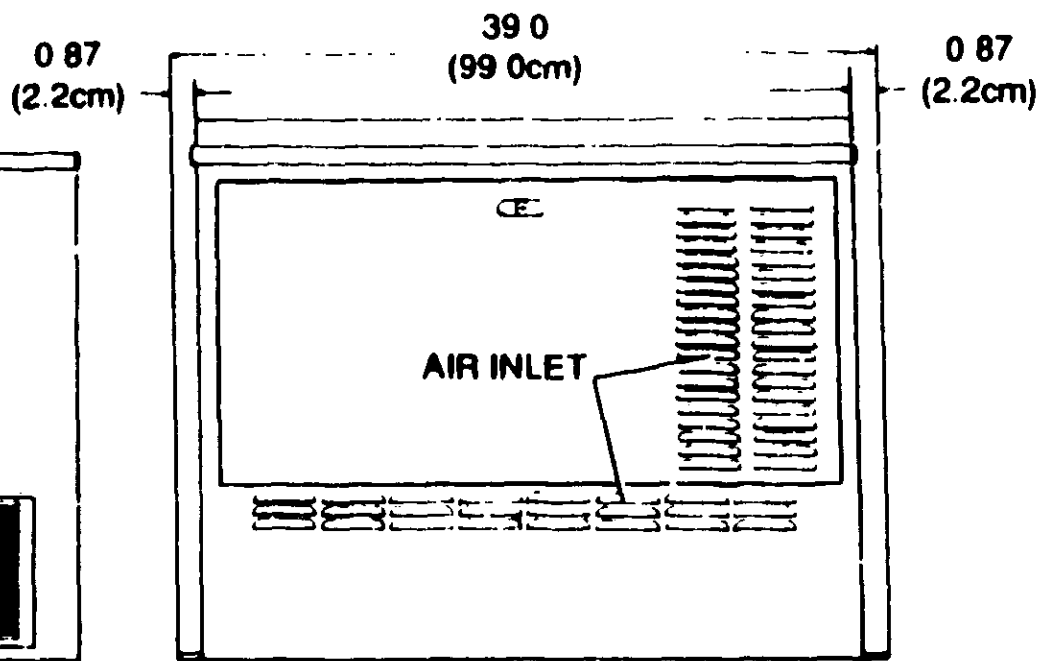
TOP OR PLAN VIEW



RIGHT SIDE VIEW



REAR VIEW



FRONT VIEW

SPECIFICATIONS

Generator Specifications

Model Number	9067-0
Rated Maximum Continuous a-c Power Capacity	8000 watts (8.0 kW)
Rated Voltage	120 and/or 240*
Power Factor	1.0
Rated Maximum Continuous Load Current	
At 120 volts a-c	66.7 amperes
At 240 volts a-c	33.3 amperes
Phase	1-Phase
Rated a-c Frequency	60 Hz*
Driven Speed of Rotor	3600 rpm*
Number of Rotor Poles	2
Winding Insulation	Class F
Rotor Drive System	Belt and Pulley

* Rated a-c frequency and voltage are obtained only at 3600 rotor rpm, which is maintained by a mechanical fixed speed type engine governor. In actuality the engine governor has been factory set to approximately 3720 rpm. Generator a-c output at 3720 rpm is approximately 62 Hz and 124/248 volts.

Engine Specifications

Type of Engine	4 Cycle Air Cooled
Number of Cylinders	2
Rated Horsepower	14 at 3000 rpm
Displacement	
In Cubic Centimeters (cc)	479.4
In Cubic Inches	29.2
Compression Ratio	8.5 to 1
Cylinder Block	Aluminum w/Cast
Iron Sleeve	
Air Cleaner	Paper Element with
Foam Pre-Cleaner	
Starter	12 volts d-c Electric
Ignition System	Solid State
Recommended Spark Plugs or equivalent	Champion RC12YC
Spark Plug Gap	0.015 inch (0.76mm)
Oil Filter	FRAM PH3614
Crankcase Oil Capacity	1.5 U.S. quarts
Oil Makeup Tank Capacity	2.5 U.S. quarts
Fuel Consumption using Natural Gas*	
In Cubic Feet per Hour	145
In Btu's	148,000
Fuel Consumption using LP Gas*	87 Cubic Feet/Hour

* Fuel consumption at rated maximum wattage capacity given. Fuel consumption when using natural gas rated at 1000 Btu's per cubic foot and LP gas rated at 2520 Btu's per cubic foot.

Fuel Requirements

The generator has been factory tested and adjusted using Natural Gas as a fuel. If LP gas (propane) is to be used the system must be readjusted as outlined in the ADJUSTMENTS section of this Manual.

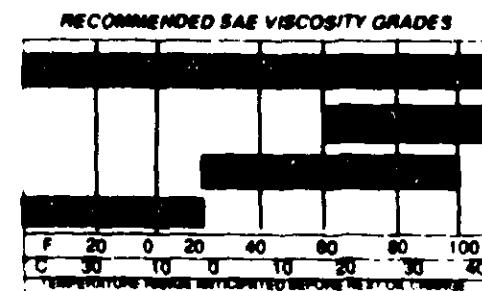
NOTE: Generator maximum wattage rating and engine rated horsepower will be affected by the type of fuel used, i.e. the specific fuel's Btu (heat) content. Wattage and horsepower may also be affected by ambient temperature, pressure, altitude and other conditions specified by the engine manufacturer. Maximum power will decrease approximately 3-12% for each 1000 feet above sea level and will decrease an additional 1% for each 10 F above 60 F.

Generator Lubrication

The generator's revolving field is supported on pre-lubricated and sealed bearings which require no additional lubrication for the life of the bearings.

Engine Lubrication

Use a high quality detergent oil that exceeds API Service SF, SF/CC or SF/CD warranty requirements for gasoline engines. The primary recommended oil is a synthetic oil such as MOBIL 1 Formula 5W-30. Synthetic oil will promote easier starting in cold temperatures and provide maximum protection in hot weather. If a non-synthetic oil is used its viscosity MUST be suitable for the lowest temperature at which the engine will be operated (see CHART below).



INSTALLATION REQUIREMENTS

General

Installation and interconnection of a home standby electrical system is not a "do-it-yourself" project. Such installation should be accomplished by a competent, qualified, licensed electrician or installation contractor. Installation of this equipment must comply strictly with applicable national, state and local electrical and building codes. In addition, regulations established by the Occupational Safety and Health Administration (OSHA) must be complied with.

The use of an approved transfer switch is required in all home standby electrical systems, to prevent electrical "feedback" between the UTILITY and the STANDBY power sources.

DANGER! FAILURE TO USE A PROPER, APPROVED TRANSFER SWITCH AS PART OF THE HOME STANDBY SYSTEM INSTALLATION MAY RESULT IN DAMAGE TO THE GENERATOR OR SERIOUS INJURY OR DEATH TO UTILITY WORKERS CAUSED BY BACKFEED OF ELECTRICAL ENERGY.

Generac could not possibly know of and advise the home standby trade of all conceivable procedures by which an installation might be performed, nor could we know of the possible hazards and/or results of each method. We have not undertaken any such wide evaluation. Therefore, anyone who uses an installation procedure, technique or method not specifically recommended by Generac must first completely satisfy himself that neither his nor the

product's safety will be endangered by the procedure, technique or method selected.

DANGER! IT IS NOT INTENDED THAT THIS INSTALLATION INFORMATION SHOULD BE USED BY ANY UNQUALIFIED PERSON(S) FOR THE INSTALLATION OF A STANDBY ELECTRIC SYSTEM. IMPROPER, INCORRECT OR UNAUTHORIZED INSTALLATION OF THIS EQUIPMENT IS EXTREMELY HAZARDOUS AND MAY RESULT IN DEATH, SERIOUS PERSONAL INJURY OR DAMAGE TO EQUIPMENT AND/OR PROPERTY.

Prior to installation

Prior to installation of the home standby electric system, reread the ratings of both the generator and the transfer switch. These components must be able to handle the maximum connected electrical load and must also be fully compatible with the rated voltage, phase, current and frequency of the electrical service entrance. Plans for proper installation should be prepared in advance with proper attention to mechanical and electrical engineering detail.

The information in this Manual is offered as a guide to aid you in finalizing your installation plans. Much of the installation information is necessarily general in nature, since we could not possibly know of every installation possibility.

Standards Index

In the absence of pertinent standards, codes, regulations and laws, the following published information booklets may be used as an installation guide for this equipment:

1 NFPA No. 37, STATIONARY COMBUSTION ENGINES AND GAS TURBINES, available from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

2 NFPA No. 76A, ESSENTIAL ELECTRICAL SYSTEMS FOR HEALTH CARE FACILITIES, obtainable same as Item 1.

3 NFPA No. 54, NATIONAL FUEL GAS CODE, available same as Item 1.

4 NFPA No. 58, AMERICAN NATIONAL STANDARD FOR THE STORAGE AND HANDLING OF LIQUEFIED PETROLEUM GAS, obtainable same as Item 1.

5 NFPA No. 70, NFPA HANDBOOK OF THE NATIONAL ELECTRIC CODE, available same as Item 1.

6 Article X, NATIONAL BUILDING CODE, available from the American Insurance Association, 85 John Street, New York, N.Y. 10038.

7 AGRICULTURAL WIRING HANDBOOK, obtainable from the Food and Energy Council, 909 University Avenue, Columbia, MO 65201.

8 ASAE EP-364, INSTALLATION AND MAINTENANCE OF FARM STANDBY ELECTRICAL SYSTEMS, available from the American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MI 49085.

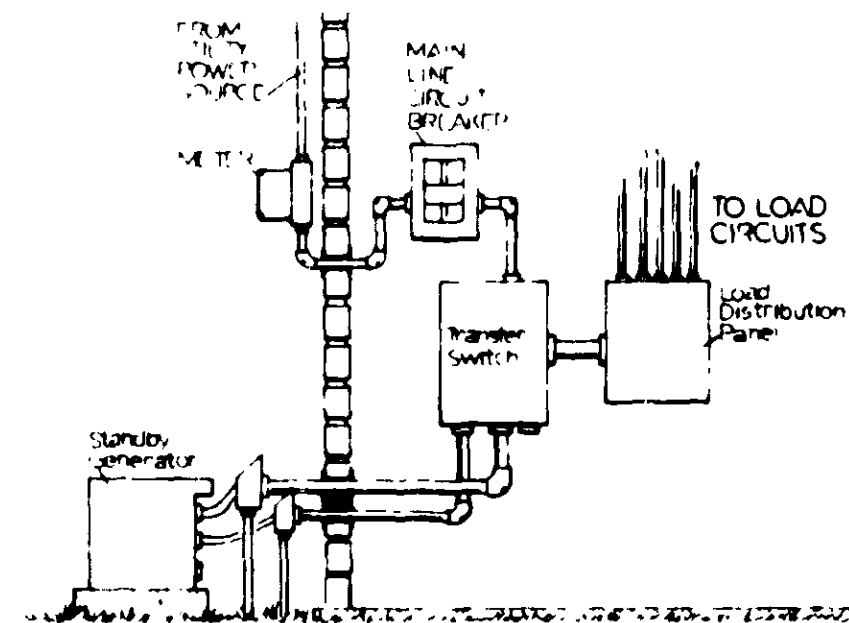
9 NFPA No. 30, FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE, available same as Item 1.

Planning the Installation

When planning the installation, be sure to consider the following factors:

- ___ 1 Location of the generator and transfer switch
- ___ 2 Method of generator support
- ___ 3 Mounting the Transfer switch

Figure 1 A Typical Home Standby Electrical System



- 4 Natural gas fuel system requirements
- 5 LP gas fuel system requirements
- 6 Electrical connections
- 7 Automatic control system connections
- 8 Preparation Before Initial Startup
- 9 Battery Installation
- 10 Initial Startup and Testing

Generator and Transfer Switch Location

Generator Location Install the generator outdoors and in an area where adequate cooling air and ventilating air will be available. Remember exhaust gases contain deadly carbon monoxide gas and proper ventilation is required to dissipate exhaust output. The engine generator requires an adequate, unobstructed flow of cooling air for proper operation.

DANGER! EXHAUST GASES CONTAIN DEADLY CARBON MONOXIDE GAS. THIS DANGEROUS GAS, IF BREATHED IN SUFFICIENT CONCENTRATIONS, CAN CAUSE UNCONSCIOUSNESS OR EVEN DEATH. OPERATE THE GENERATOR ONLY IN OPEN, WELL VENTILATED AREAS, WHERE EXHAUST GASES WILL NOT ACCUMULATE AND ENDANGER PEOPLE. THERE MUST BE NO POSSIBILITY OF EXHAUST GASES ENTERING A BUILDING OCCUPIED BY PEOPLE OR ANIMALS.

Install the generator where grass, leaves, snow, etc., will not accumulate and obstruct cooling air openings in its compartment. If prevailing winds are likely to cause blockage of the cooling air openings, you may wish to consider the use of a windbreak to protect the generator.

The installer must also consider water levels at the installation site. Never install the generator on low ground, where water might rise and endanger the unit.

Finally, install the generator as close as possible to the fuel supply. This will reduce the cost of piping runs.

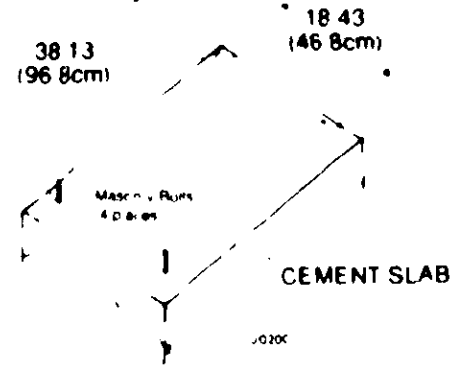
Allow adequate room around all sides of the generator for maintenance, servicing and repair. A general rule is to allow at least 3 feet of clearance on all sides of the unit.

Transfer Switch Location: Install the transfer switch indoors, as close as possible to the UTILITY power source electrical service entrance. This will reduce the cost of electrical wiring and conduit.

Generator Mounting and Support

Generator mounting dimensions are shown on Page 4. The generator's compartment enclosure should be securely mounted to a cement slab, using 1/4 inch masonry type anchor bolts of sufficient length for proper retention. The concrete slab should be at least 3 inches thick and should extend beyond the compartment at least 3 inches on all sides. See Figure 2. Be sure to level the slab, so that the generator is resting on a level surface.

Figure 2 Mount the Generator to a Cement Slab



Transfer Switch Mounting

See Page 4 for Transfer Switch mounting dimensions. Mount the switch to a strong, rigid supporting structure that can adequately support its weight. If necessary, level the switch to prevent distortion. This can be done by placing washers between the switch and supporting structure when leveling is necessary.

CAUTION! Never install the transfer switch where water, corrosive fluids, or any liquid might drip onto its enclosure. Protect the switch against dust, dirt, moisture, construction grit, and corrosive vapors at all times.

Natural and LP Gas Fuel System Installation

When planning the fuel supply system installation, keep fuel piping runs as short as possible for cost reduction.

DANGER! GASEOUS FUELS ARE HIGHLY EXPLOSIVE. THE SLIGHTEST SPARK WILL RESULT IN FIRE OR AN EXPLOSION. ALL APPLICABLE FUEL-GAS CODES, STANDARDS AND REGULATIONS MUST BE STRICTLY COMPLIED WITH FOR SAFETY. INSTALLATION OF GASEOUS FUEL PIPING AND COMPONENTS SHOULD BE ACCOMPLISHED BY A COMPETENT, QUALIFIED GASEOUS FUEL TECHNICIAN.

NOTE: The following information is provided to assist the gaseous fuel technician in planning the installation of the fuel supply system. In no way must the information be interpreted to conflict with local, state or national fuel-gas codes. Consult with your gas supplier or local fire marshal if any questions should arise.

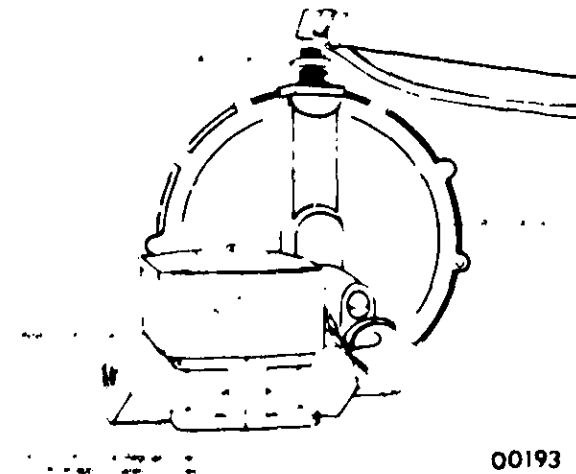
The gas fuel system is shown in Figure 3. A length of flexible fuel line, approved for use with gaseous fuels, should be installed between the generator and rigid fuel piping. This flexible line should be sufficiently long to prevent breakage if the generator should shift or settle.

Rigid gaseous fuel piping should be of black iron, properly installed and supported. DO NOT USE GALVANIZED PIPING. THE GALVANIZED COATING WILL FLAKE OFF AND CLOG REGULATORS AND LINES.

Gaseous fuel pressure at the inlet to the regulator must be 11 inches of water (6.38 ounces per inch²). Under no circumstances should regulator inlet pressure be more than 26 inches of water (15 ounces per inch²). To measure system pressure, use a water manometer or an accurate gauge calibrated in ounces per square inch.

The system was properly adjusted at the factory, using natural gas. If LP gas (propane) is to be used as a fuel, readjustment of the system will be necessary. See ADJUSTMENTS section.

Figure 3 The Generator Fuel System



00193

WARNING! BE SAFE. INSTALL THE GASEOUS FUEL SYSTEM PER APPLICABLE STANDARDS AND CODES. GASEOUS FUEL LINES MUST BE PROPERLY PURGED AND LEAK TESTED BEFORE PLACING THE GENERATOR INTO SERVICE. NO LEAKAGE IS PERMITTED. NATURAL GAS IS LIGHTER THAN AIR AND TENDS TO SETTLE IN HIGH AREAS. LP GAS (PROPANE) IS HEAVIER THAN AIR AND SETTLES IN LOW AREAS. EVEN THE SLIGHTEST SPARK CAN IGNITE THESE GASES AND CAUSE FIRE OR AN EXPLOSION.

The Generator a-c Connection System

See Figure 5. The generator is equipped with a 120/240 volt, 3-wire connection system. Stator a-c output leads 11 and 44 form the two "Hot" leads, the junction of Stator a-c output leads 22 and 33 form the "Neutral" lead.

Wiring Interconnections

DANGER! DO NOT ATTEMPT ANY WIRING INTERCONNECTIONS UNTIL ALL POWER VOLTAGE SUPPLIES TO THE TRANSFER SWITCH HAVE BEEN POSITIVELY TURNED OFF. FAILURE TO TURN OFF POWER VOLTAGE SUPPLIES WILL RESULT IN EXTREMELY HAZARDOUS AND POSSIBLY LETHAL ELECTRICAL SHOCK. ALL WIRING CONNECTIONS SHOULD BE DONE BY A COMPETENT, QUALIFIED ELECTRICIAN AND MUST COMPLY STRICTLY WITH APPLICABLE CODES AND STANDARDS.

See Figure 4. Connect approved wiring to Terminals E1 and E2 of the generator's main circuit breaker and to the generator's "Neutral" terminal. Then, route that wiring to identically numbered terminals in the transfer switch.

Figure 4 Home Standby System Interconnection Diagram (Drawing No. 74106)

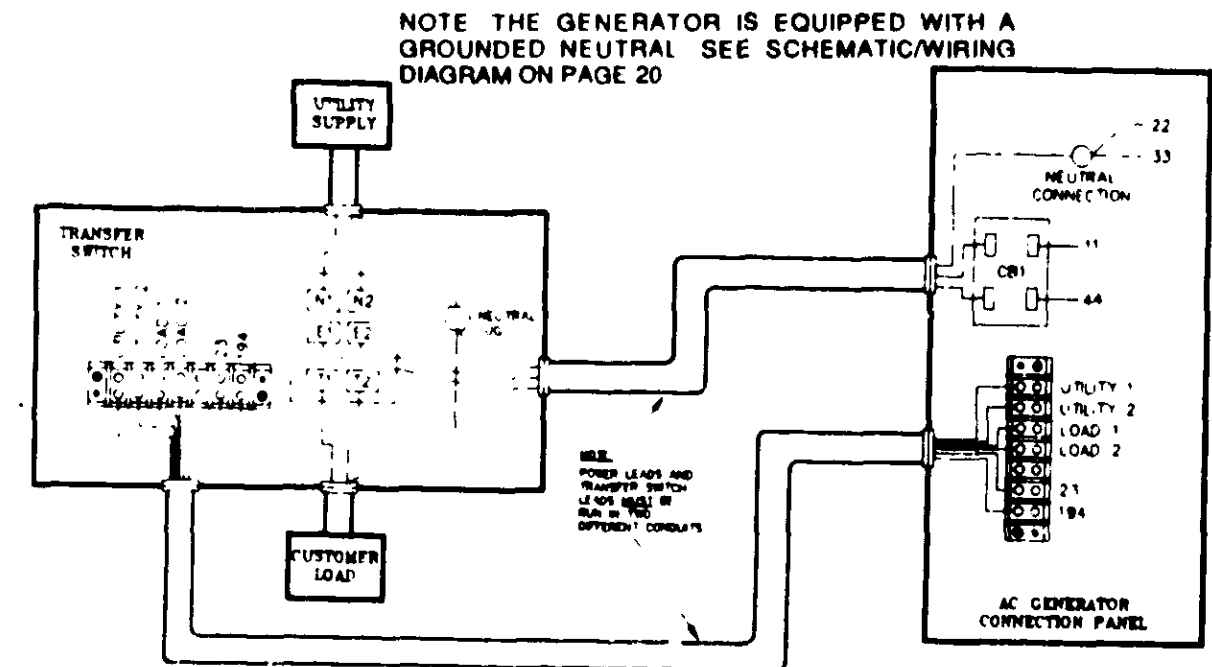
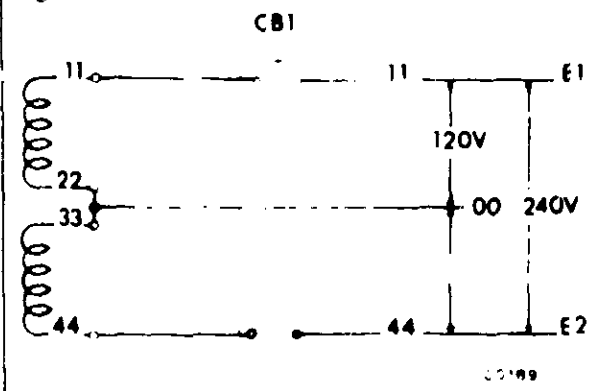


Figure 5 The Generator a-c Connection System



Connect the UTILITY power supply lines through a main line circuit breaker of proper rating and to Transfer Switch Terminals N1, N2 and Neutral.

Connect the customer LOAD leads from the main distribution panel to transfer switch terminals T1, T2 and Neutral.

All electrical wiring must be of approved insulative qualities, properly supported and installed in approved conduit. A flexible length of conduit must be used between the generator set and rigid conduit to prevent breakage if the generator shifts or settles.

The generator set is equipped with a main circuit breaker. Use of adequate approved overcurrent protection is also required in the UTILITY power supply.

CAUTION! The generator set utilizes an ungrounded "Neutral". If that Neutral is grounded, any shorted condition may result in damage to the unit. For that reason, grounding of the Neutral line is recommended only at the main electrical service entrance.

Grounding the Generator

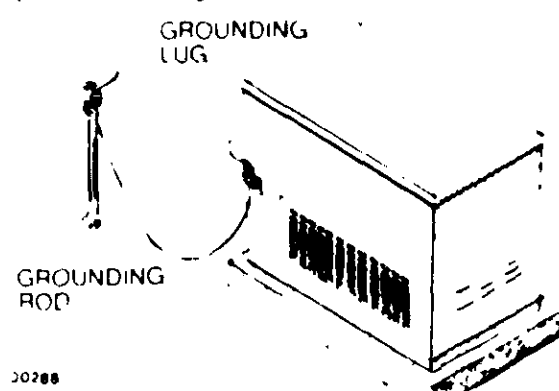
The National Electric Code requires that the frame and external electrically conductive parts of the generator be properly connected to an approved earth ground. Local electrical codes may also require proper grounding of the unit. For that purpose, a grounding lug is provided on the generator compartment. Grounding is accomplished by connecting a suitable length of stranded copper wire to an earth-driven copper or brass rod (electrode). Consult a local electrician for grounding requirements in your area. See Figure 6.

Proper grounding will reduce the possibility of electrical shock in the event of a ground fault condition in the generator or in connected electrical devices. Grounding will also help dissipate static electricity, which often builds up in ungrounded equipment. Static electricity alone can cause very painful shock and may cause one to believe that a shorted condition exists in equipment.

Control System Interconnections

See Figure 4. Control system interconnections consist of UTILITY 1 and 2, LOAD 1 and 2, and leads 23 and 194. Control system interconnecting leads MUST be run in a conduit that is separate from the a-c power lead conduit.

Figure 6 Grounding the Generator



DANGER! DO NOT ATTEMPT ANY CONTROL LEAD CONNECTIONS UNTIL YOU ARE SURE THE BATTERY CABLES ARE DISCONNECTED. IF BATTERY IS CONNECTED, THE ENGINE WILL START AS SOON AS CONNECTIONS ARE COMPLETED. SEE BATTERY INSTALLATION INSTRUCTIONS.

CAUTION! When control system interconnections are completed, UTILITY source power will be delivered to the generator's Control (Logic) circuit board to operate a battery trickle charger. This means the battery cables will be electrically hot as soon as control interconnections are completed, providing the UTILITY power supply to the transfer switch is turned ON TO PREVENT BATTERY CABLES FROM BECOMING ELECTRICALLY HOT, DO NOT TURN THE UTILITY POWER SUPPLY ON UNTIL AFTER BATTERY CABLES HAVE BEEN PROPERLY CONNECTED.

Battery Installation

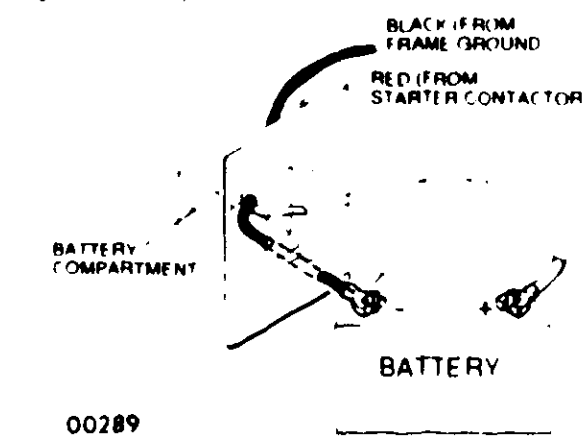
WARNING! ON THE GENERATOR PANEL, BE SURE TO SET THE MANUAL-OFF-AUTO SWITCH TO ITS "OFF" POSITION BEFORE CONNECTING THE BATTERY. IF THE SWITCH IS NOT SET TO "OFF", THE GENERATOR WILL CRANK AND START AS SOON AS BATTERY CABLES ARE CONNECTED.

Recommended is a 12 volts, automotive type (Group 26) storage battery rated 35 amp-hours or more. The battery MUST be properly serviced with electrolyte fluid and fully charged prior to installation. Battery cables were factory installed and connected to the generator.

See Figure 7. Connect the RED battery cable from the engine starter contactor to the battery post indicated by a POSITIVE POS or (+). Connect the BLACK cable from generator frame ground, to the battery post indicated by a NEGATIVE NEG or (-). Cable connections must be CLEAN and TIGHT.

NOTE! When the UTILITY power supply to the transfer switch is turned ON, battery will receive a trickle charge from that power source. The trickle charger will NOT recharge a discharged battery. During engine operation, the battery will receive a charging current from the generator's battery charge circuit.

Figure 7 Battery Cable Connections



Post Installation Inspection

Prior to initial startup and testing of the home standby system, inspect the entire installation carefully. Make sure the unit has been properly installed, in accordance with applicable codes and standards. Review the installation instructions and information in this Manual and make sure all recommendations have been complied with. Also review applicable standards booklets to ensure that those standards have been complied with. Some areas may require that the installation be inspected and approved by a local building and/or electrical inspector.

POST INSTALLATION TESTS

General

The home standby generator was factory tested and adjusted using natural gas as a fuel and should require no additional adjustment. However, special circumstances (such as changeover to LP gas) will require some minor adjustment.

CAUTION! Do NOT make any unnecessary adjustments. Factory settings are correct for most applications. Adjustments should be attempted only by a qualified generator service technician.

DANGER! USE CARE NOT TO OVERSPEED THE ENGINE DURING ANY ADJUSTMENT. EXCESSIVELY HIGH OPERATING SPEEDS ARE DANGEROUS AND MAY RESULT IN PERSONAL INJURY OR DAMAGE TO EQUIPMENT AND OR PROPERTY. THE GENERATOR WILL SUPPLY CORRECT RATED FREQUENCY AND VOLTAGE ONLY AT THE PROPER RATED SPEED. SOME ELECTRICAL DEVICES MAY BE DAMAGED BY INCORRECT FREQUENCY AND OR VOLTAGE.

Preparation Before Initial Startup

Prior to initial startup and testing, make sure the home standby system has been properly installed and interconnected. See POST INSTALLATION INSPECTION on this page.

After a very thorough post installation inspection has been completed and all discrepancies corrected, prepare the system for use as follows:

1. On the generator panel, set the Manual Off Auto switch to OFF position.
2. Make sure the UTILITY power supply to the transfer switch has been positively turned OFF using whatever means provided (such as the UTILITY main line circuit breaker).
3. Check engine crankcase oil level. If necessary, add the recommended oil to the dipstick FULL mark only.

NOTE! DO NOT OVERFILL ABOVE FULL MARK. See MAINTENANCE section for oil level check and fill procedures. The engine crankcase was filled with the recommended oil prior to shipment. However, it is the responsibility of the installer to ensure that crankcase oil level is correct before attempting startup.

CAUTION! Any attempt to crank and start the engine before it has been properly serviced with the recommended oil will result in an engine failure. Both the engine crankcase and the Oil Makeup Tank must be properly serviced with oil.

4. Fill the OIL MAKEUP TANK with the same type and grade of oil used in the engine crankcase. See MAINTENANCE section BOTH THE ENGINE CRANKCASE AND THE OIL MAKEUP TANK MUST BE PROPERLY SERVICED.

Transfer Switch Manual Operation

1. Check that the generator's Manual Off Auto switch has been set to OFF position.
2. Turn OFF the UTILITY power supply to the transfer switch using whatever means provided (such as the UTILITY source main line circuit breaker).
3. Set the generator's main circuit breaker to its OFF or OPEN position.

DANGER! FAILURE TO TURN OFF ALL POWER VOLTAGE SUPPLIES TO THE TRANSFER SWITCH BEFORE ATTEMPTING MANUAL OPERATION WILL RESULT IN EXTREMELY HAZARDOUS AND POSSIBLY FATAL ELECTRICAL SHOCK.

4. A MANUAL TRANSFER HANDLE is retained at the base of the transfer switch enclosure by means of a wing stud. Remove the wing stud, then remove the manual transfer handle.

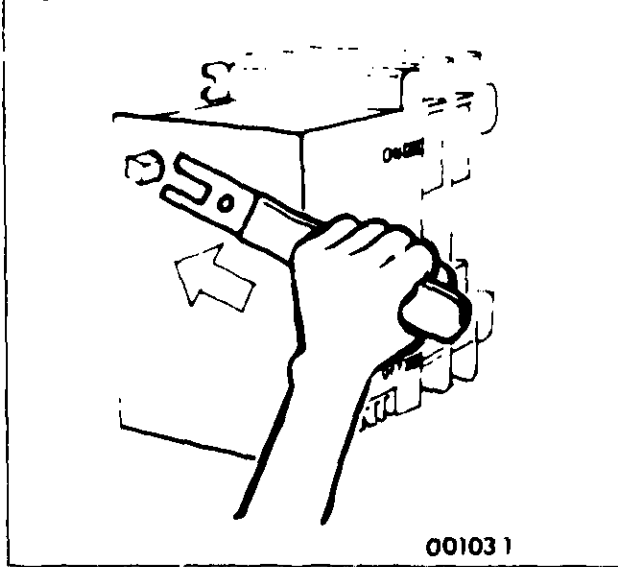
5 Place the open end of the manual transfer handle over the square shaft at upper left corner of the transfer mechanism. See Figure 8

6 Actuate the manual transfer handle downward then let it move back to its original position. Check the visual display in windows A and B as follows:

- a If the word ON appears in window A and the word OFF in window B the LOAD is connected to the UTILITY power source (Power Source A)
- b If the word OFF appears in window A and the word ON in window B, LOAD is connected to the STANDBY power source (Power Source B)

7 Manually actuate the transfer switch main contacts to both positions several times. When satisfied that manual operation is correct, connect the LOAD to the UTILITY power source (Window A reads ON, window B reads OFF).

Figure 8 Transfer Switch Manual Operation



Transfer Switch Electrical Checks

1 Turn ON the UTILITY power supply to the transfer switch, using whatever means provided (such as the UTILITY main line circuit breaker)

DANGER! PROCEED WITH CAUTION THE TRANSFER SWITCH IS NOW ELECTRICALLY HOT. CONTACT WITH LIVE TERMINALS WILL RESULT IN EXTREMELY HAZARDOUS AND POSSIBLY FATAL ELECTRICAL SHOCK.

2 Use an accurate a-c voltmeter to check for correct voltage across terminal lugs N1 and N2, N1 to NEUTRAL, and finally, N2 to NEUTRAL. See Figure 8

3 When certain that UTILITY supply voltage is correct and compatible with transfer switch ratings, turn OFF the UTILITY supply to the transfer switch

4 On the generator panel, set the Manual Off-Auto switch to MANUAL position. The generator should crank and start

5 Let the generator stabilize and warm up at no load for at least 5 minutes

6 Set the generator's main circuit breaker (CB1) to its ON or CLOSED position

DANGER! PROCEED WITH CAUTION GENERATOR OUTPUT VOLTAGE IS NOW BEING DELIVERED TO TRANSFER SWITCH TERMINALS. CONTACT WITH LIVE TERMINALS WILL RESULT IN EXTREMELY DANGEROUS AND POSSIBLY FATAL ELECTRICAL SHOCK.

7 Use an accurate a-c voltmeter and frequency meter to check the no-load voltage and frequency at transfer switch terminal lugs E1, E2 and NEUTRAL. Readings should be as follows:

a Frequency	61-63 Hz
b Terminals E1 to E2	242-252 volts
c Terminal E1 to Neutral	121-126 volts
d Terminal E2 to Neutral	121-126 volts

8 Set the generator's main circuit breaker (CB1) to its OFF or OPEN position

9 To shut the generator down, set its Manual Off Auto switch to OFF position

NOTE: Do NOT proceed until generator a-c output voltage and frequency are correct and within stated limits. If the no-load voltage is correct but no-load frequency is incorrect, the engine governed speed probably requires adjustment. If no-load frequency is correct but voltage is not, the voltage regulator may require adjustment.

Generator Tests Under Load

1 Set the generator's main circuit breaker to its OFF or OPEN position

2 Manually actuate the transfer switch main contacts to their STANDBY position, i.e., Window A reads OFF and window B reads ON

3 To start the generator, set the Manual Off-Auto switch to MANUAL. When engine starts, let it stabilize for a few minutes

4 Turn the generator's main circuit breaker to its ON or CLOSED position. LOAD circuits are now being powered by the generator. Check generator operation under load as follows:

- a Turn ON electrical loads to the full rated wattage/ampere capacity of the generator. DO NOT OVERLOAD
- b With maximum rated load applied, check voltage and frequency across transfer switch terminals E1 and E2. Voltage should be greater than 230 volts, frequency should be greater than 58 Hz
- c Let the generator run under rated load for at least 30 minutes. With unit running, listen for unusual noises, vibration, overheating, etc. that might indicate a problem

5 When checkout under load is complete, set the generator's main circuit breaker to its OFF or OPEN position

6 Let the generator run at no-load for several minutes. Then shut down by setting the Manual Off Auto switch to its OFF position

7 Manually actuate the transfer switch main contacts to their UTILITY position, i.e., window A reads ON and window B reads OFF

8 Turn ON the UTILITY power supply to the transfer switch

9 Set the generator's Manual Off Auto switch to its AUTO position. The system is now set for fully automatic operation

OPERATION

Using the Manual-Off-Auto Switch

MANUAL Position: Use this switch position to crank and start the generator engine. Transfer to the STANDBY source will not occur following startup. Provides a "test" of the automatic operating circuit.

OFF Position: Shuts the engine down and prevents automatic startup.

AUTO Position: Provides fully automatic operation. When AUTO is selected, generator will start and exercise every 7 days.

DANGER! WHEN "AUTO" IS SELECTED THE STANDBY GENERATOR MAY CRANK AND START AT ANY TIME WITHOUT WARNING TO PREVENT POSSIBLE INJURY THAT MIGHT BE CAUSED BY SUCH SUDDEN STARTUP. ALWAYS SET THE SWITCH TO "OFF" BEFORE WORKING ON OR AROUND THE EQUIPMENT. THEN, PLACE A "DO NOT OPERATE" TAG ON THE GENERATOR AND TRANSFER SWITCH.

To Select Automatic Operation

To set the system for fully automatic operation, proceed as follows:

1 Check that the LOAD is connected to the UTILITY power source. Transfer switch window A should indicate ON, window B should read OFF

2 Check that UTILITY source power is available to transfer switch terminals

3 Set the generator's Manual Off Auto switch to AUTO

4 Set the generator's main circuit breaker (CB1) to ON or CLOSED position

Sequence of Automatic Operation

A Control Logic circuit board, located inside the generator panel, constantly monitors UTILITY power source voltage. Should that source voltage drop below a pre-set level, circuit board action will initiate automatic generator startup. Following startup, transfer of the LOAD to the STANDBY source will occur. On restoration of UTILITY source voltage to a pre-set value, circuit board action will initiate re-transfer back to the UTILITY source and generator shutdown. The actual sequence for automatic operation may be described as follows:

1 A UTILITY VOLTAGE SENSOR on the Control Logic circuit board senses that UTILITY voltage has dropped below approximately 60% of nominal supply voltage

2 After a 6 second delay, the engine cranks and starts

NOTE: The delay is necessary to prevent false starts that might be caused by transient UTILITY source voltage dips

3 An engine warmup time delay lets the generator engine warm up for approximately 15 seconds before transfer to the STANDBY source can occur

4 A STANDBY voltage sensor checks STANDBY source voltage

5 When STANDBY source voltage is above approximately 50% of nominal and engine has warmed up for approximately 15 seconds, transfer to STANDBY will occur

6 If UTILITY source voltage is restored above approximately 80% of the nominal supply voltage, a Re-Transfer Time Delay (on the Control Logic board) starts timing. After a time delay of approximately 6 seconds, re-transfer back to the UTILITY source will occur

NOTE: The Re-Transfer Time Delay is necessary to prevent re-transfer that might otherwise be caused by transient UTILITY source voltages

7 Following re-transfer, an Engine Cooldown Timer (on Control Logic board) starts timing. After 1 minute, the engine will shut down

Weekly Exercise Cycle

Once every 7 days, on a day and at a time of day selected, the standby generator will crank and start. The unit will run for approximately 15 minutes, will then shut down. Transfer of the LOAD to the STANDBY source will not occur during the weekly exercise cycle

To select the day and time of day for system exercise, proceed as follows (see Figure 9):

1 Set the generator's Manual Off Auto switch to OFF

2 Turn OFF the generator's main circuit breaker (CB1)

3 Gain access to the generator's control panel interior and locate the Control Logic circuit board. On the circuit board, locate the push button type switch identified by the words "SET EXERCISE" (SW1)

4 Set the Manual Off Auto switch to AUTO

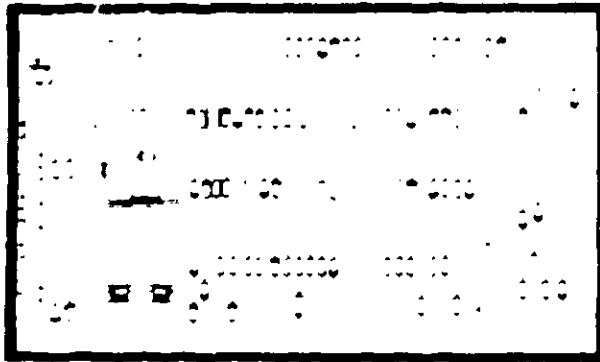
5 On the desired day and time of exercise, push the switch in and hold for about 15-30 seconds. The engine will start and exercise will occur every 7 days thereafter at the selected time

6 To shut the generator down set the Manual Off Auto switch to OFF

NOTE To reset system for fully automatic operation see TO SELECT AUTOMATIC OPERATION (Page 12)

Figure 9 Control Logic Circuit Board (Set Exercise)

SET EXERCISE SWITCH



30791

Effects of Moisture and Dirt on Generators

If moisture is permitted to remain in contact with generator electrical windings some of the moisture will be retained in voids and cracks of the winding insulation. This will eventually reduce the resistance of the windings. Insulation used on Generac windings is moisture resistant. However, prolonged exposure to moisture can eventually cause problems.

Dirt can worsen the problem since it tends to hold moisture into contact with the windings. Salt (as from sea air) can also worsen the problem since salt tends to absorb moisture from the air. When salt and moisture combine they make a good electrical conductor.

Because of the deteriorative effects of moisture and dirt it is recommended that the insulation resistance of generator windings be checked periodically by a qualified generator service technician. If insulation resistance is excessively low the technician may wish to dry the windings.

Effects of Heat and Cold

The standby generator gives off considerable heat while running. It is recommended that the generator be used where ambient temperatures do not exceed 105 F. In extremely hot climates shade the unit from the sun's heat.

The engine will start most readily when not subjected to extreme cold. Where strong prevailing winds might tend to increase the chill factor protect the installation by installing a wind break. Such a wind break might be planned to prevent accumulations of leaves, grass, snow, etc. as well.

Cooling Air Requirements

The generator requires an adequate flow of cooling air for continued proper operation. The free flow of cooling air into and out of the unit must never be obstructed.

MAINTENANCE

WARNING! BEFORE ATTEMPTING TO SERVICE OR REPAIR THE GENERATOR OR TRANSFER SWITCH, ALWAYS SET THE MANUAL-OFF-AUTO SWITCH TO ITS "OFF" POSITION. THIS WILL PREVENT AUTOMATIC STARTUP AND POSSIBLE INJURY THAT MIGHT BE CAUSED BY AUTOMATIC STARTUP AND TRANSFER AFTER TURNING THAT SWITCH "OFF". TURN OFF THE UTILITY POWER SUPPLY TO THE TRANSFER SWITCH, USING WHATEVER MEANS PROVIDED THE GENERATOR'S CONTROL LOGIC CIRCUIT BOARD AND THE BATTERY CABLES ARE ELECTRICALLY HOT AS LONG AS UTILITY SOURCE POWER IS AVAILABLE.

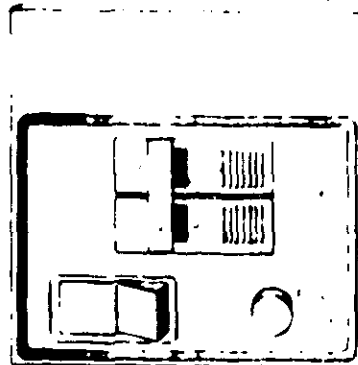
15 Amp Fuse

See Figure 10. A 15 amp Fuse located on the generator control panel protects the unit's d-c control system against overload. If the fuse element has melted open due to an overload, engine cranking and startup cannot occur. Should fuse replacement become necessary, use only an identical 15 amp fuse.

Main Circuit Breaker

The generator's a-c output circuit is protected against overload by a 35 amp 2-pole circuit breaker (CB1). If connected electrical loads exceed the circuit breaker rating (35 amps at 240 volts equals 8400 watts or 8.4 kW), the breaker will open. This will result in loss of generator output power to the transfer switch and to all connected loads. To prevent the breaker from tripping open, make sure the generator is never overloaded.

Figure 10 Generator Control Panel Components



Checking Engine Oil Level

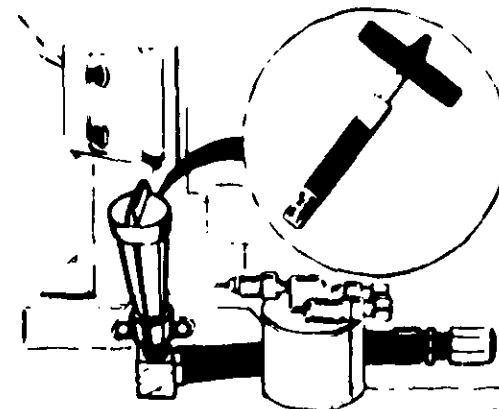
For recommended oils and capacities see ENGINE LUBRICATION on Page 5. It is recommended that engine oil level be checked every 10 hours of operation or at least once each month, whichever comes first. To check engine oil level proceed as follows (see Figure 11):

- 1 Remove DIPSTICK and wipe dry with a clean cloth.
- 2 Install and tighten dipstick cap, then remove again. Oil level should be at the dipstick FULL mark. If necessary add oil to the FULL mark only. DO NOT OVER FILL ABOVE THE "FULL" MARK.

CAUTION! Never operate the engine with oil level below the ADD mark on dipstick. This will result in damage to the engine.

- 3 Install and tighten dipstick.

Figure 11 Engine Oil Dipstick and Fill Tube



00197

NOTE Also check oil level in OIL MAKEUP TANK. See OIL MAKEUP SYSTEM on Page 18.

Change Engine Oil

See Figure 12. Change engine oil after the first 5 hours of operation. Thereafter change oil every 100 operating hours. Change oil more frequently if operating consistently under heavy load or at high ambient temperatures. To change oil proceed as follows:

- 1 Run engine until thoroughly warmed up. Then shut down.

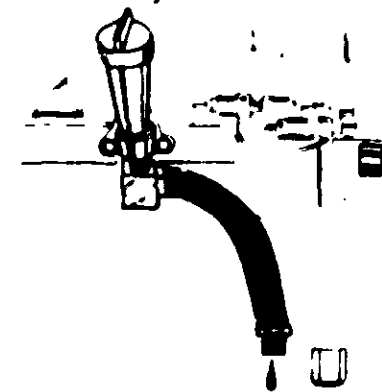
NOTE To start engine use MANUAL position of generator panel switch. To shut down set the switch to OFF.

- 2 Immediately after shutdown pull the OIL DRAIN HOSE free of its retaining clip. Remove CAP from hose and drain crankcase completely into a suitable container.

- 3 When all oil has drained install CAP onto end of OIL DRAIN HOSE. Then retain hose in its retaining clip.

- 4 Refill with proper recommended oil (see Page 5).

Figure 12 Oil Drain Hose

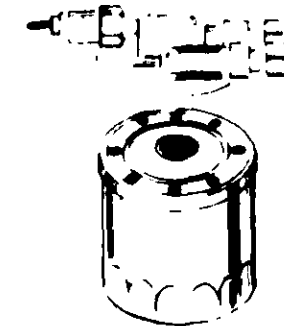


00195

Change Engine Oil Filter

See Figure 13. Remove and replace oil filter every second oil change (every 200 operating hours). Before installing new filter, lightly coat the filter seal with engine oil. Screw filter on by hand until seal seats firmly against filter adapter. Then tighten about 1/4 to 1/2 turn more. Start engine and check for oil leakage.

Figure 13 Engine Oil Filter



00194

Service Engine Air Cleaner

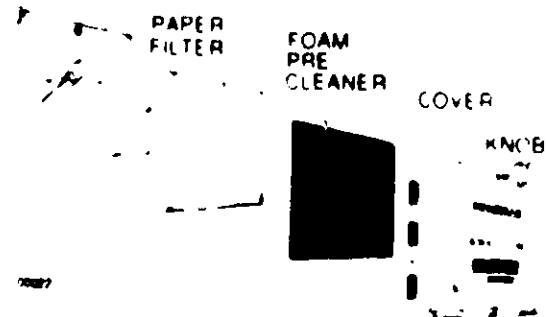
See Figure 14. Clean and re-oil the FOAM PRE-CLEANER every 3 months or every 25 operating hours, whichever occurs first. Service more frequently if operating under extremely dusty or dirty conditions. Service the FOAM PRE-CLEANER as follows:

- 1 Turn KNOB counterclockwise to loosen.
- 2 Remove COVER, FOAM PRE-CLEANER and PAPER FILTER.
- 3 Wash FOAM PRE-CLEANER in kerosene or in liquid detergent and water. Wrap FOAM PRE-CLEANER in cloth and squeeze dry.
- 4 Saturate FOAM PRE-CLEANER in engine oil. Squeeze to remove excess oil.

5 Install FOAM PRE CLEANER into COVER followed by PAPER FILTER. Tabs on side of PAPER FILTER must lock into slots of COVER.

6 Install air cleaner assembly and retain with KNOB.

Figure 14 Engine Air Cleaner Assembly



Once annually or every 100 hours of operation (whichever comes first) clean PAPER FILTER by tapping gently on a flat surface. If extremely dirty replace it or wash in a low or non-sudsing detergent and warm water solution. Rinse thoroughly with flowing water from inside to outside until water runs clear. PAPER FILTER must be allowed to stand and air dry thoroughly before being used.

CAUTION! DO NOT oil the PAPER FILTER. DO NOT use any petroleum solvents, such as kerosene to clean the FILTER. DO NOT use pressure air to clean or dry paper filter.

Inspect Battery

DANGER! DO NOT DISCONNECT ANY BATTERY CABLE UNTIL AFTER THE UTILITY SUPPLY TO THE TRANSFER SWITCH HAS BEEN TURNED OFF. WITH UTILITY SOURCE POWER AVAILABLE TO THE TRANSFER SWITCH, A TRICKLE CHARGE CURRENT IS DELIVERED TO THE BATTERY WHICH CAN CAUSE ELECTRICAL ARCING WHEN CABLES ARE REMOVED. IF SUCH ARCING OCCURS WHEN HYDROGEN GAS IS PRESENT, THE BATTERY CAN EXPLODE.

DANGER! WHEN CHARGING, STORAGE BATTERIES GIVE OFF EXPLOSIVE HYDROGEN GAS. DO NOT PERMIT SMOKING, OPEN FLAME, SPARKS OR ANY SOURCE OF HEAT NEARBY WHEN CHECKING BATTERY.

DANGER! BATTERY ELECTROLYTE FLUID IS AN EXTREMELY CAUSTIC SULFURIC ACID SOLUTION THAT CAN CAUSE SEVERE BURNS. DO NOT PERMIT FLUID TO CONTACT EYES, SKIN, CLOTHING, PAINTED SURFACES, WIRING INSULATION ETC. IF SPILLAGE OCCURS, FLUSH THE AFFECTED AREA WITH CLEAR WATER IMMEDIATELY.

Inspect battery at least once each month. Check fluid level in all battery cells and if necessary add DISTILLED WATER only to level recommended by battery manufacturer. DO NOT USE TAP WATER IN BATTERY. Inspect cables, posts and terminals for cleanliness and corrosion. Clean any dirty or corroded cable connection.

At least once every 6 months use an automotive type battery hydrometer to test battery state of charge and condition. Follow the hydrometer manufacturer's instructions. If necessary remove battery and charge to a 100% state of charge using an automotive type battery charger. Replace any defective or worn out battery.

NOTE: Generally the battery is considered to be at a 100% state of charge when the specific gravity of its electrolyte fluid (as measured with a hydrometer) is 1.260. A 1.230 specific gravity indicates a 75% state of charge. A reading of 1.200 indicates a 50% state of charge. 1.170 a 25% state of charge.

Inspect Cooling System

The generator and its driving engine are air cooled. Once each month inspect all cooling air inlet and outlet openings for obstructions. All air openings must be open and unobstructed.

Transfer Switch Maintenance

Keep the transfer switch CLEAN and DRY. Once annually have the switch assembly inspected and tested by an authorized service technician. The technician will inspect the switch for arcing, burning, hot spots, damage, etc. He will also test automatic and manual operation of the switch.

System Inspection

Inspect the entire standby electric system every 6 months. Look for fuel, oil, exhaust leaks, obvious damage, etc. Repair any discrepancies found immediately. See INSTALLATION REQUIREMENTS (Pages 5 through 9).

DANGER! THE HOME STANDBY SYSTEM MUST HAVE BEEN INSTALLED IN STRICT COMPLIANCE WITH APPLICABLE ELECTRICAL, FUEL-GAS AND BUILDING CODES FOLLOWING INSTALLATION. NOTHING MUST BE DONE THAT WILL RENDER THE SYSTEM IN NON-COMPLIANCE WITH SUCH CODES AND STANDARDS.

ADJUSTMENTS

General

The home standby generator was factory tested and adjusted using natural gas as a fuel. No additional adjustments should be required. However, special circumstances (such as conversion to LP gas) will require some minor adjustment.

CAUTION! DO NOT make any unnecessary adjustments. Factory settings are correct for most applications. Adjustment should be done by a qualified generator service technician.

WARNING! DO NOT OVERSPEED THE ENGINE WHILE MAKING ADJUSTMENTS. EXCESSIVELY HIGH OPERATING SPEEDS ARE DANGEROUS AND MAY RESULT IN INJURY OR DAMAGE TO EQUIPMENT. THE GENERATOR WILL SUPPLY CORRECT RATED FREQUENCY AND VOLTAGE ONLY AT THE PROPER GOVERNED SPEED. SOME ELECTRICAL LOADS MAY BE DAMAGED BY INCORRECT FREQUENCY AND OR VOLTAGE.

Gaseous Fuel Load Block Adjustment

Tools Required: straight slot screwdriver, 17mm open end wrench, and an accurate frequency meter (55-65 Hz range).

Procedure for Natural Gas

1. On the generator panel, set the Manual Off/Auto switch to OFF.
2. Turn OFF the UTILITY power supply to the transfer switch using whatever means provided (such as the UTILITY main line circuit breaker).
3. Manually actuate the transfer switch to its STANDBY position (window A reads OFF, window B reads ON).
4. With unit shut down, connect a 13.5 amp load at 240 volts or a 27 amp load at 120 volts to the unit. This can be done by turning on only the necessary load circuits to provide the required current draw and turning off all other load circuits at the load distribution panel(s).
5. See Figure 15. Loosen the LOAD BLOCK LOCK NUT.
6. Turn SLOTTED ADJUSTMENT clockwise until it just bottoms. DO NOT FORCE OR DAMAGE TO LOAD BLOCK MAY OCCUR.
7. Turn LOAD BLOCK IDLE ADJUST clockwise until it just bottoms. DO NOT FORCE OR DAMAGE TO THE LOAD BLOCK MAY OCCUR.
8. Turn SLOTTED ADJUSTMENT counterclockwise 1 1/2 turns.
9. Turn the LOAD BLOCK IDLE ADJUST counterclockwise 1/2 turn.
10. Connect an accurate frequency meter across transfer switch terminals E1 and E2.

11. Set the generator's main circuit breaker (CB1) to its OFF or OPEN position to unload the generator.

12. Start the generator. Let it stabilize and warm up.

13. If unit is running rough, slowly turn the SLOTTED ADJUSTMENT clockwise until unit has reached its maximum speed (62 Hz). DO NOT TURN THE ADJUSTMENT SCREW ANY FURTHER THAN IS REQUIRED TO OBTAIN 62 HZ.

14. Apply the 13.5 amp load at 240 volts or 27 amp load at 120 volts. Since connection of the load was previously done in Step 4, this only requires that the generator main circuit breaker (CB1) be set to its ON or CLOSED position.

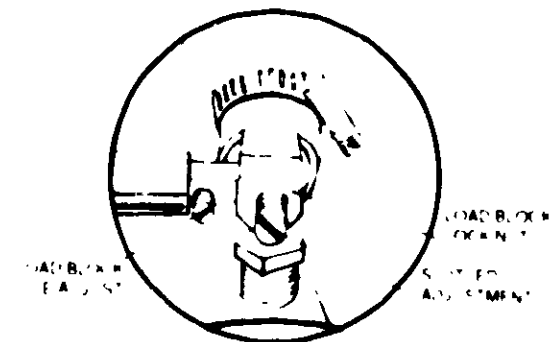
15. With load applied, turn the SLOTTED ADJUSTMENT slowly clockwise just enough to obtain a frequency of 62 Hz. DO NOT EXCEED 62 HZ.

16. With unit running at 62 Hz, back out the SLOTTED ADJUSTMENT 3 full turns. Hold that adjustment and tighten the LOAD BLOCK LOCK NUT. The main fuel setting at this point is complete.

17. Disconnect the load, i.e. turn the main circuit breaker (CB1) to OFF or OPEN.

18. Adjust the LOAD BLOCK IDLE ADJUST in or out until the unit is running smoothly at 62 Hz. The idle fuel setting at this point is complete.

Figure 15 Generator Load Block Adjustment Points



Procedure for LP Gas

1. On the generator panel, set the Manual Off/Auto switch to OFF.
2. Turn OFF the UTILITY power supply to the transfer switch using whatever means provided (such as the UTILITY main line circuit breaker).

3 Manually actuate the transfer switch main contacts to their STANDBY position (ie window A reads OFF and window B reads ON)

4 With unit shut down, connect a 25 amp load at 240 volts or a 50 amp load at 120 volts

5 See Figure 15. Loosen the LOAD BLOCK LOCK NUT

6 Turn the SLOTTED ADJUSTMENT and the LOAD BLOCK IDLE ADJUST in until they are softly seated. DO NOT OVERTIGHTEN OR LOAD BLOCK MAY BE DAMAGED

7 Back out the SLOTTED ADJUSTMENT 1 1/2 turns

8 Back out the LOAD BLOCK IDLE ADJUST 1/2 turn

9 Set the generator's main circuit breaker (CB1) to its OFF or OPEN position so that engine may be started in an unloaded condition

10 If unit is running rough, slowly turn the SLOTTED ADJUSTMENT counterclockwise until an accurate frequency meter reads 62 Hz. DO NOT TURN ADJUSTMENT SCREW ANY FURTHER THAN IS REQUIRED TO OBTAIN 62 HZ

11 Apply the LOAD (ie set the generator's main circuit breaker (CB1) to its ON or CLOSED position (Proper loads were connected in Step 4)

12 Turn the SLOTTED ADJUSTMENT slowly clockwise until the frequency meter reads 62 Hz. DO NOT EXCEED 62 HZ

13 With frequency meter reading 62 Hz, turn the SLOTTED ADJUSTMENT an additional 1/2 turns counterclockwise. Hold that adjustment and tighten the LOAD BLOCK LOCK NUT. The main fuel setting at this point is complete

14 Remove load from the unit (ie set the generator main circuit breaker to OFF or OPEN)

15 Slowly adjust the LOAD BLOCK IDLE ADJUST in or out until unit is running smoothly at 62 Hz. The idle fuel setting at this point is complete

Engine Governor Adjustment

Proper a-c frequency and voltage will only be supplied at the correct engine speed. If both the frequency and the voltage are high or low, adjust the engine governor as follows:

NOTE: For no-load voltage and frequency check procedure, see TRANSFER SWITCH ELECTRICAL CHECKS on Page 11

1 With generator shut down, visually inspect the ANTI-LASH SPRING. Make sure it is not broken or disengaged

2 Loosen the GOVERNOR CLAMP NUT. Push spring end of GOVERNOR LEVER all the way up (wide open throttle position). While holding the GOVERNOR LEVER in this position, insert a screwdriver into the slotted end of the GOVERNOR SHAFT and rotate the SHAFT fully counterclockwise. Hold the shaft in this position and tighten the GOVERNOR CLAMP NUT to 100 inch-pounds

3 Start the engine at no load, let it stabilize and warm up

4 Turn the ADJUSTER NUT to obtain a frequency reading of 61.63 Hz

5 Check the a-c voltage reading. If not within 244.252 volts (line to line) or 122.126 volts (line to neutral), the voltage regulator may require adjustment

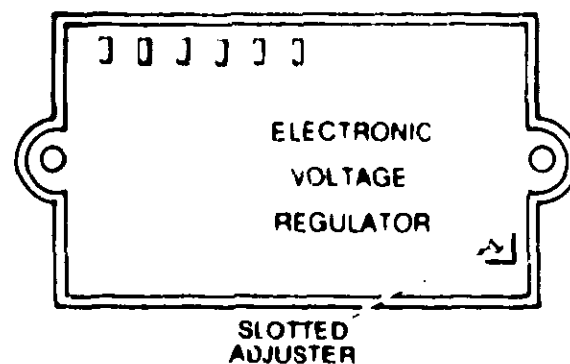
Figure 16. Engine Governor Adjustment Points



Voltage Regulator Adjustment

See Figure 17. With a-c frequency at 61.63 Hz, turn the Voltage Regulator SLOTTED ADJUSTER until voltage reads 244.252 volts (line-to-line) or 122.126 volts (line to neutral)

Figure 17. Voltage Regulator Adjustment Potentiometer



PROTECTIVE SYSTEMS AND DEVICES

General

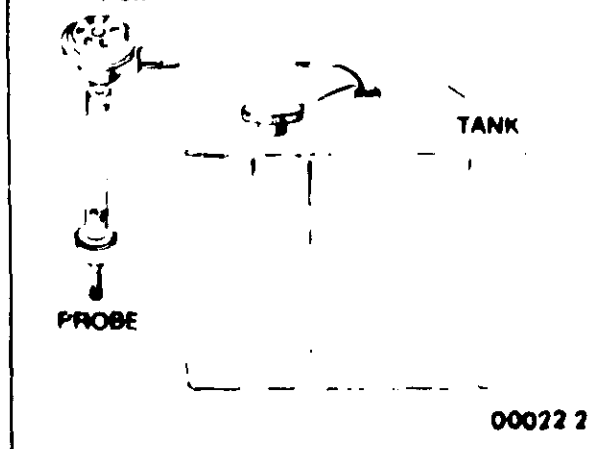
The generator engine is equipped with several systems/devices which protect it against (a) low oil levels, (b) low oil pressure, and (c) high oil temperature

The generator's Voltage Regulator incorporates a circuit that protects against over-voltage conditions

Oil Makeup System

See Figure 18. The Oil Makeup System protects the engine against damaging low oil levels that might occur during extended operating periods. The system consists of an Oil Makeup TANK, an Oil Makeup PROBE, and Oil Makeup PUMP, and interconnecting lines. When engine crankcase oil level is sufficient to cover the tip of the PROBE, no pumping action will occur. Should oil level in the crankcase drop below the PROBE tip, crankcase vacuum/pressure pulses will operate the PUMP. During PUMP operation oil will be drawn from the TANK and delivered through the PROBE tip until the PROBE is again submerged in oil. Pumping action will then stop.

Figure 18. Oil Makeup System



Both the Oil Makeup Tank and the engine crankcase must be properly filled with the recommended oil. Check oil level in the Oil Makeup Tank when engine crankcase oil level is checked (see Page 14). The Tank and the engine crankcase should be filled with the same type and grade of oil.

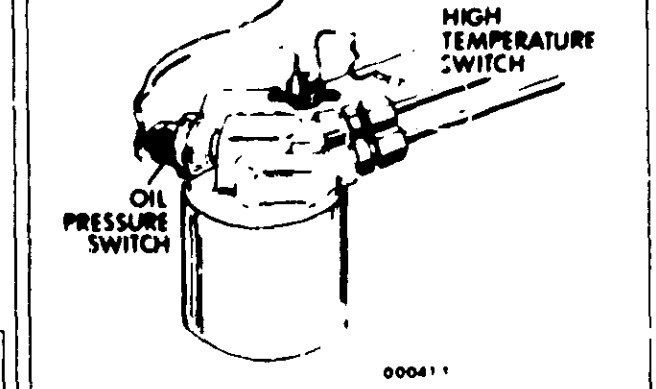
Low Oil Pressure Shutdown

The engine mounts a LOW OIL PRESSURE SWITCH (Figure 19). The switch has normally closed (N.C.) contacts which are held open by engine oil pressure during cranking and startup. Should oil pressure drop below approximately 8-12 psi (0.562-0.844 kg/cm²), an automatic shutdown will occur.

High Temperature Shutdown

See Figure 19. The engine mounts a HIGH OIL TEMPERATURE SWITCH with normally-open (N.O.) contacts. Should engine oil temperature exceed approximately 284° F (140° C), the switch contacts will close and an automatic engine shutdown will occur.

Figure 19. Low Oil Pressure & High Oil Temperature Switches



Overvoltage Protection

The generator's a-c output voltage is regulated by a solid state VOLTAGE REGULATOR (Figure 20). This Regulator receives unregulated alternating current from the Stator Excitation winding and, based on "sensing" signals from the Stator a-c Power windings, supplies regulated direct current to the Rotor windings. This type of regulation system is often called a "voltage over frequency" type, since voltage is maintained at about a 2-to-1 ratio to frequency. For example, at a 60 Hz frequency voltage will be maintained at 120/240 volts (±2%).

The Voltage Regulator is equipped with an over-voltage protection circuit. This circuit will protect the system against high voltage surges that might damage some connected electrical devices (such as TV's, VCR's, microwaves, etc.)

NOTE: In the event of an over-voltage condition, the Regulator will open the circuit to the Rotor winding. Generator a-c electrical output will then drop to nearly zero (to a voltage equivalent to residual magnetism in the Rotor plus field boost magnetism). The protective circuit is "self-resetting" so that when generator output voltage returns to a safe value, normal a-c output will resume.

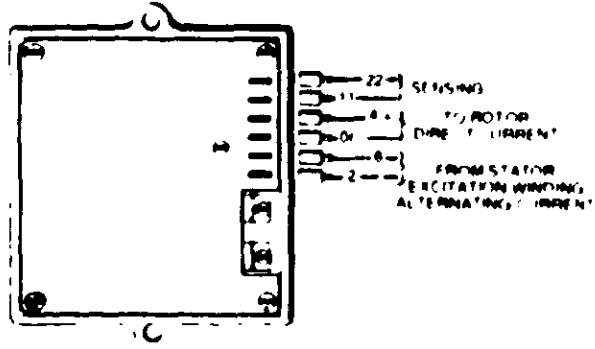
NOTE: If an open condition occurs in Regulator sensing leads 11 and 22, the system will attempt to go to a "full field" condition. This will result in an over-voltage condition and subsequent loss of a-c output.

Field Boost

See Figure 21. Battery voltage is always available to the generator's Control Logic circuit board, via the 15 amp fuse. During startup, circuit board action delivers this voltage to the Rotor. Application of this Field Boost voltage to the Rotor windings "flashes the field" on every startup. This ac-

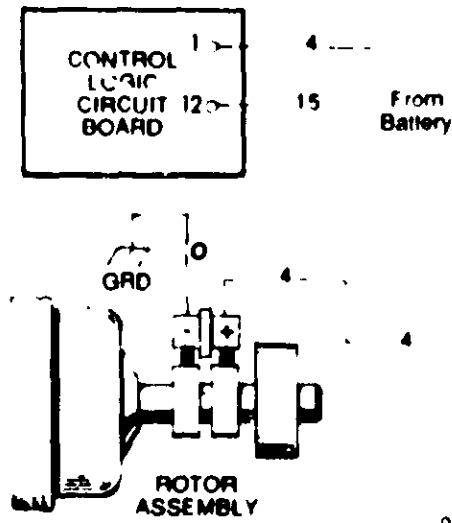
tion ensures that an adequate magnetic field is available to produce the required "pickup" voltage in the stator windings on every start

Figure 20 Voltage Regulator Input Output Connections



00283

Figure 21 Field Boost Circuit



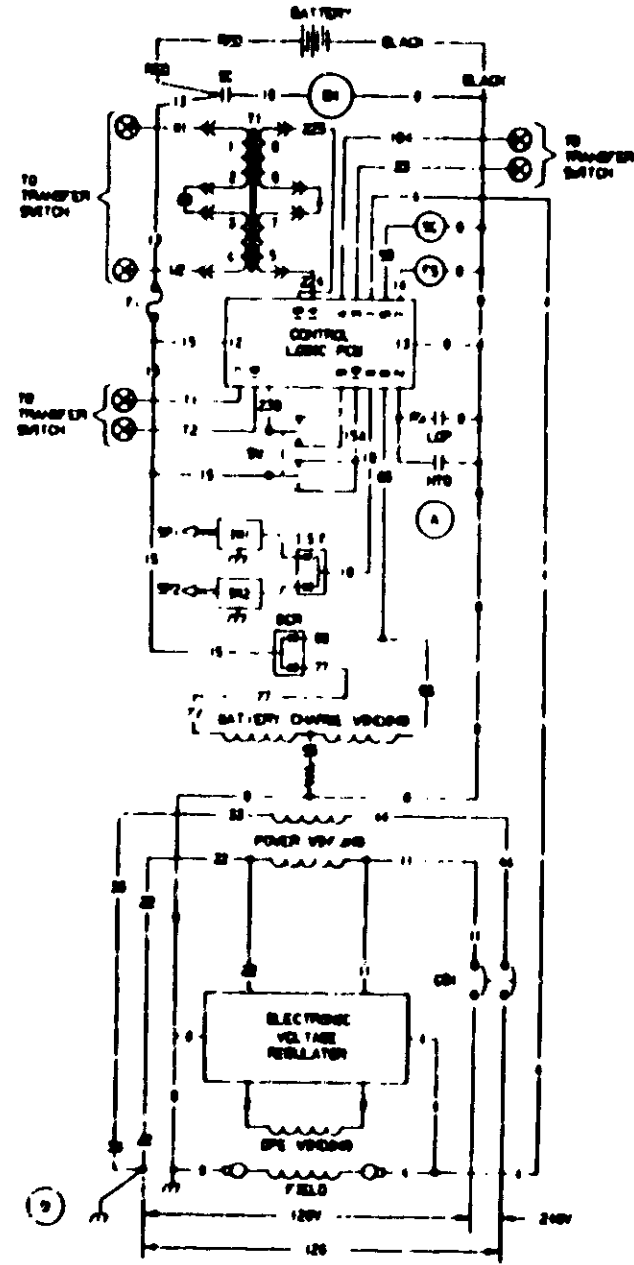
00284

TROUBLESHOOTING CHART

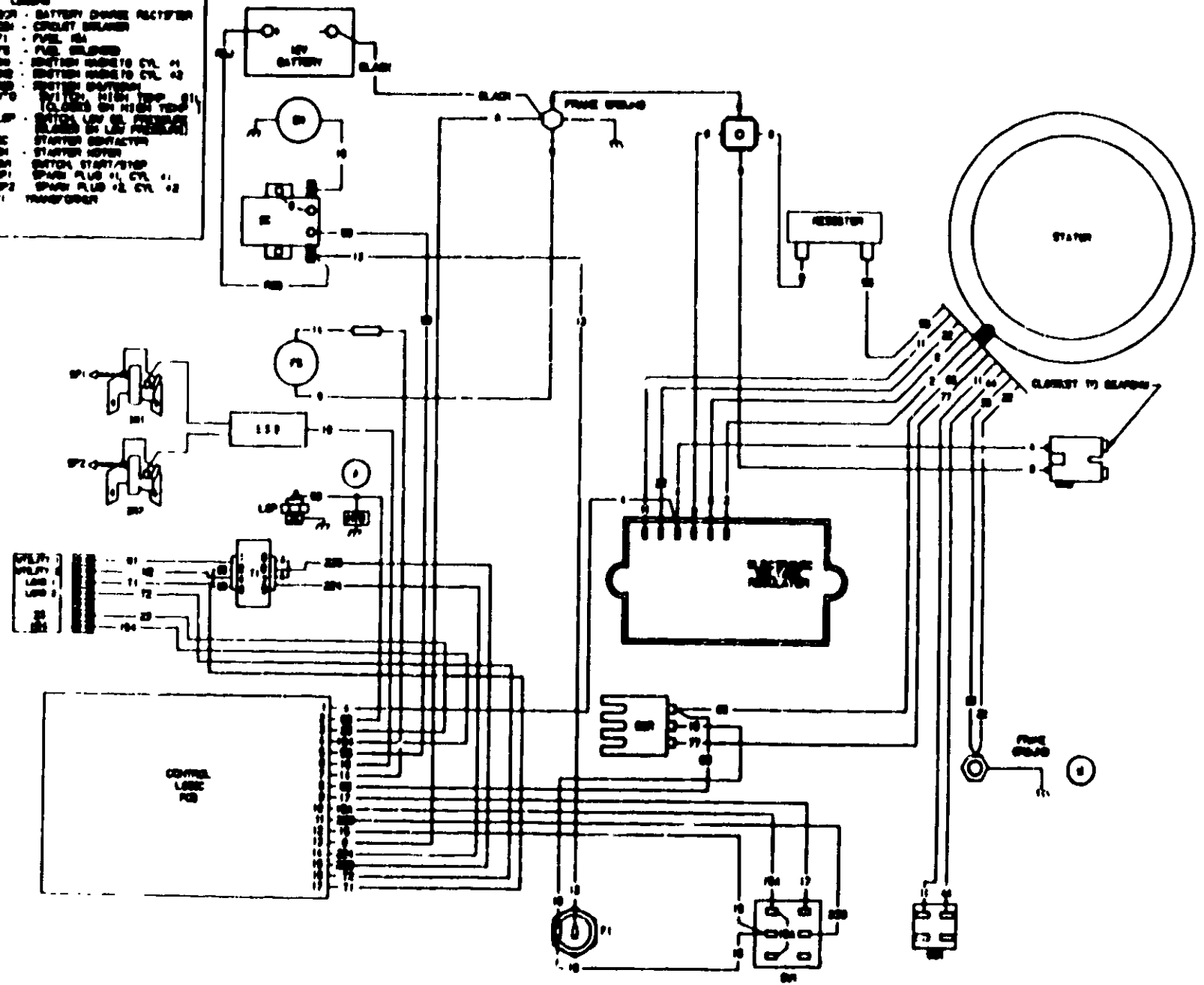
SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Switch at MANUAL engine won't crank	1 Blown 15 amp fuse	1 Replace 15 amp fuse
	2 Loose, dirty or corroded battery cables or connections	2 Tighten, clean or replace cable cables or connections
	3 Weak battery	3 Recharge or replace battery
	4 Bad Manual Off-Auto switch	4 Replace bad switch
	5 Open or shorted control wires	5 Repair or replace bad wires
	6 Bad Control Logic circuit board	6 Replace bad circuit board
No transfer to STANDBY after UTILITY source failure	1 Defective transfer switch coil	1 Test/replace actuating coil
	2 Defective transfer relay	2 Test/replace transfer relay
	3 Open transfer signal circuit	3 Repair/replace bad wire(s)
	4 Bad Control Logic circuit board	4 Replace defective circuit board
Engine will not stop cranking with switch at MANUAL or AUTO	1 Open or shorted control circuit wires	1 Repair/replace bad wire(s)
	2 Defective Control Logic board	2 Replace bad circuit board
Engine cranks, will not start	1 Incorrect gas pressure	1 See Page 7
	2 Bad fuel solenoid valve	2 Replace bad valve
	3 Open or shorted Wire #14	3 Repair or replace bad wire(s)
	4 Problem in engine ignition system	4 Repair/replace bad ignition part
Low or no a-c output	1 Open main circuit breaker (CB1)	1 Reset (close) main breaker
	2 Open sensing lead(s) to Voltage Regulator	2 Repair/replace bad sensing lead
	3 Overvoltage has caused Regulator to open Rotor circuit	3 Run unit at no-load for 5 minutes and then try again
	4 Defective Rotor or Stator	4 Test and replace, if necessary
	5 Short in a connected load	5 Disconnect shorted load

THIS PAGE
INTENTIONALLY LEFT
BLANK

GENERATOR WIRING DIAGRAM & ELECTRICAL SCHEMATIC

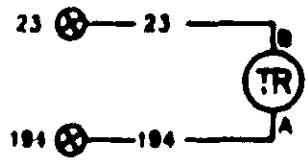
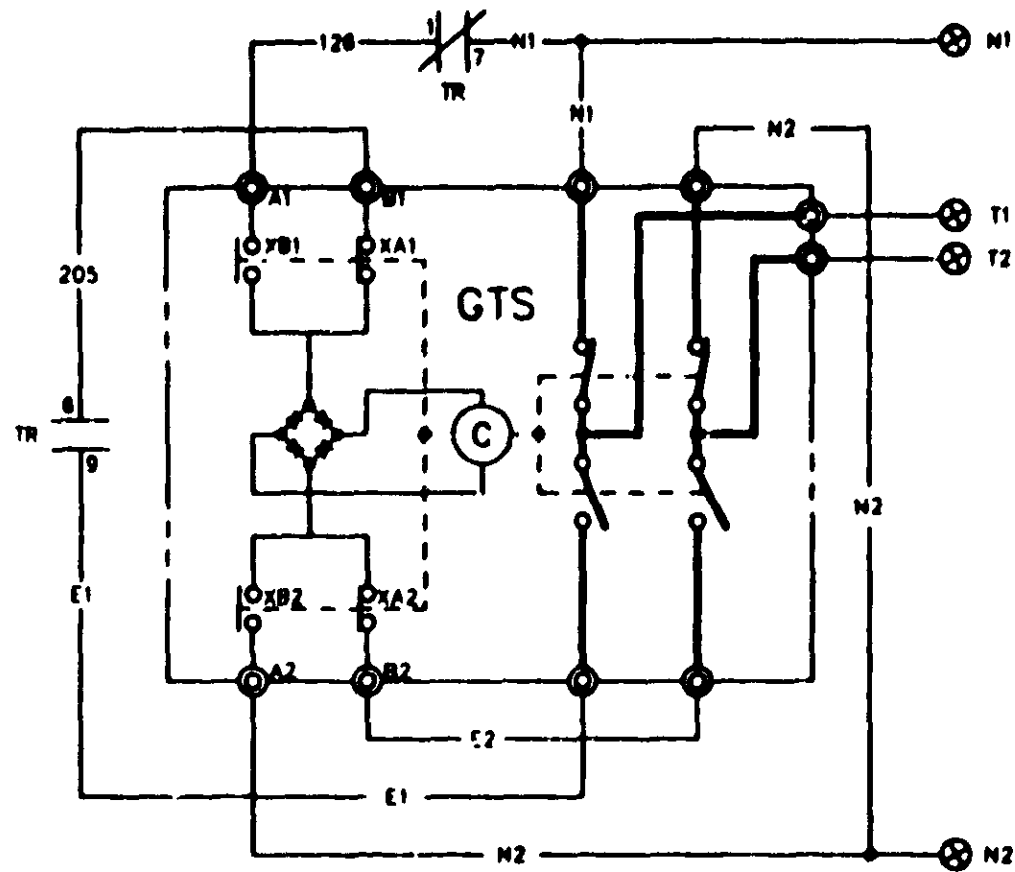


- LEGEND**
- 10 - BATTERY CHARGE RECTIFIER
 - 11 - CIRCUIT BREAKER
 - 12 - FUSE #1
 - 13 - FUSE #2
 - 14 - BATTERY WINDING TO CYL #1
 - 15 - BATTERY WINDING TO CYL #2
 - 16 - BATTERY WINDING TO CYL #3
 - 17 - HIGH SPEED
 - 18 - TO LOW ON HIGH SPEED
 - 19 - SWITCH LOW ON HIGH SPEED
 - 20 - STARTER CONTACT
 - 21 - STARTER MOTOR
 - 22 - STARTER START/STOP
 - 23 - STARTER PLUS #1 CYL #1
 - 24 - STARTER PLUS #2 CYL #2
 - 25 - TRANSFORMER



TRANSFER SWITCH WIRING DIAGRAM & ELECTRICAL SCHEMATIC

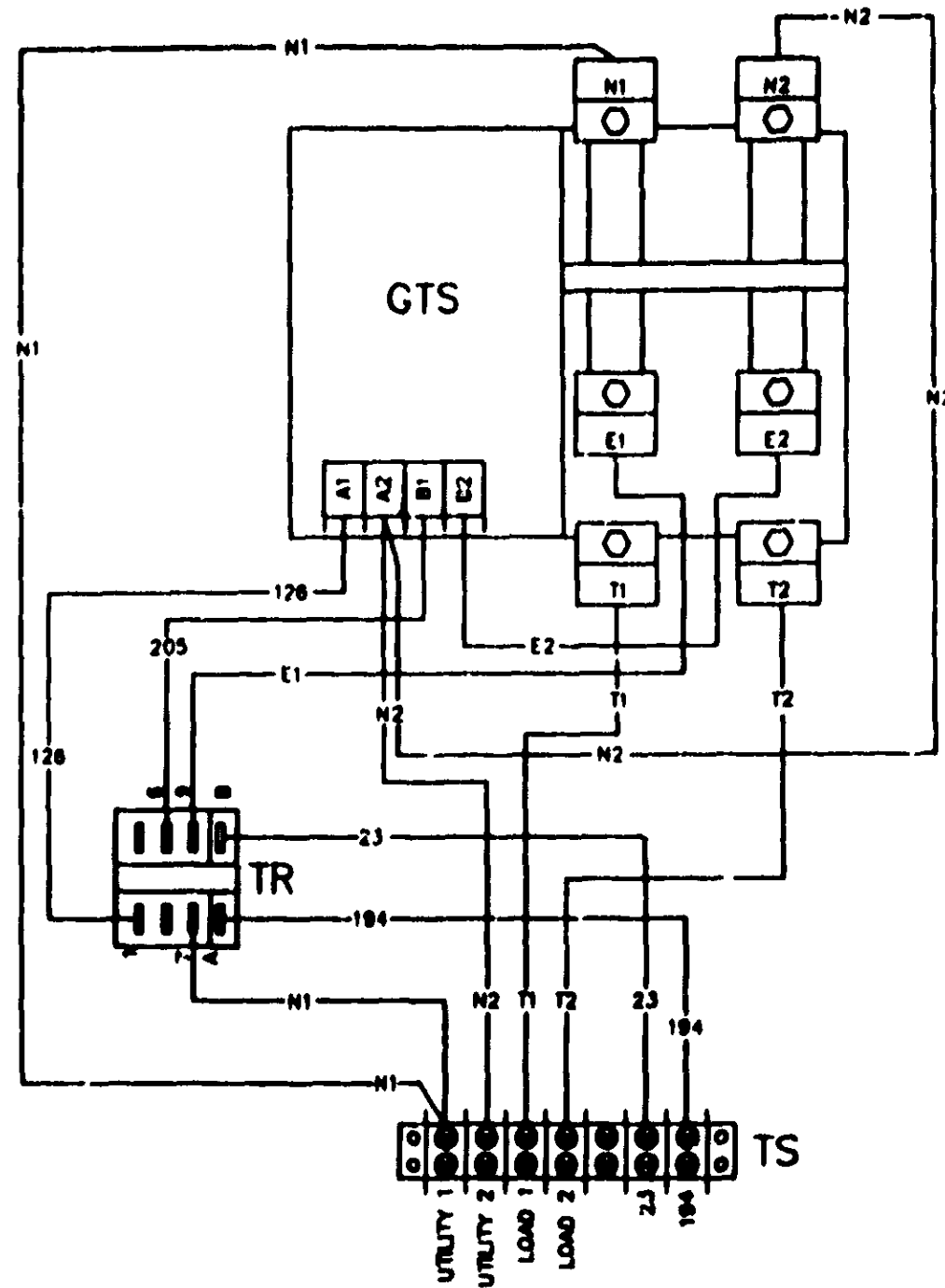
SCHEMATIC DIAGRAM



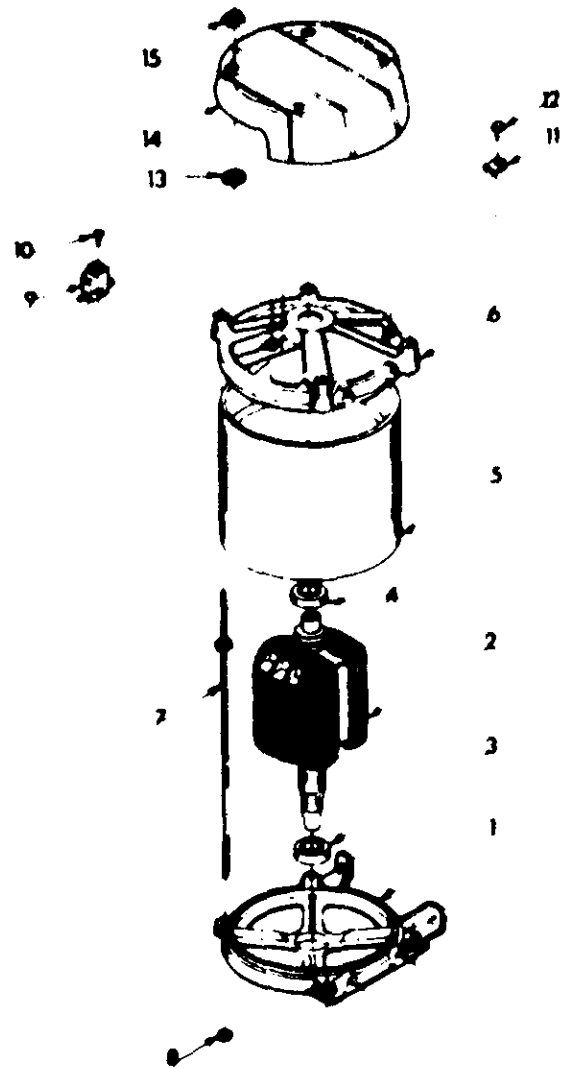
NOTE.
ALL CONTACTS SHOWN WITH
TRANSFER SWITCH IN UTILITY
POSITION.

LEGEND	
XA1, XA2, XB1, XB2	- LIMIT SWITCHES, ACTUATOR
C	- CONTACTOR ACTUATING COIL
GTS	- TRANSFER SWITCH CONTACTOR
TR	- RELAY, TRANSFER
TS	- TERMINAL STRIP (CUSTOMER CONNECTION)

WIRING DIAGRAM

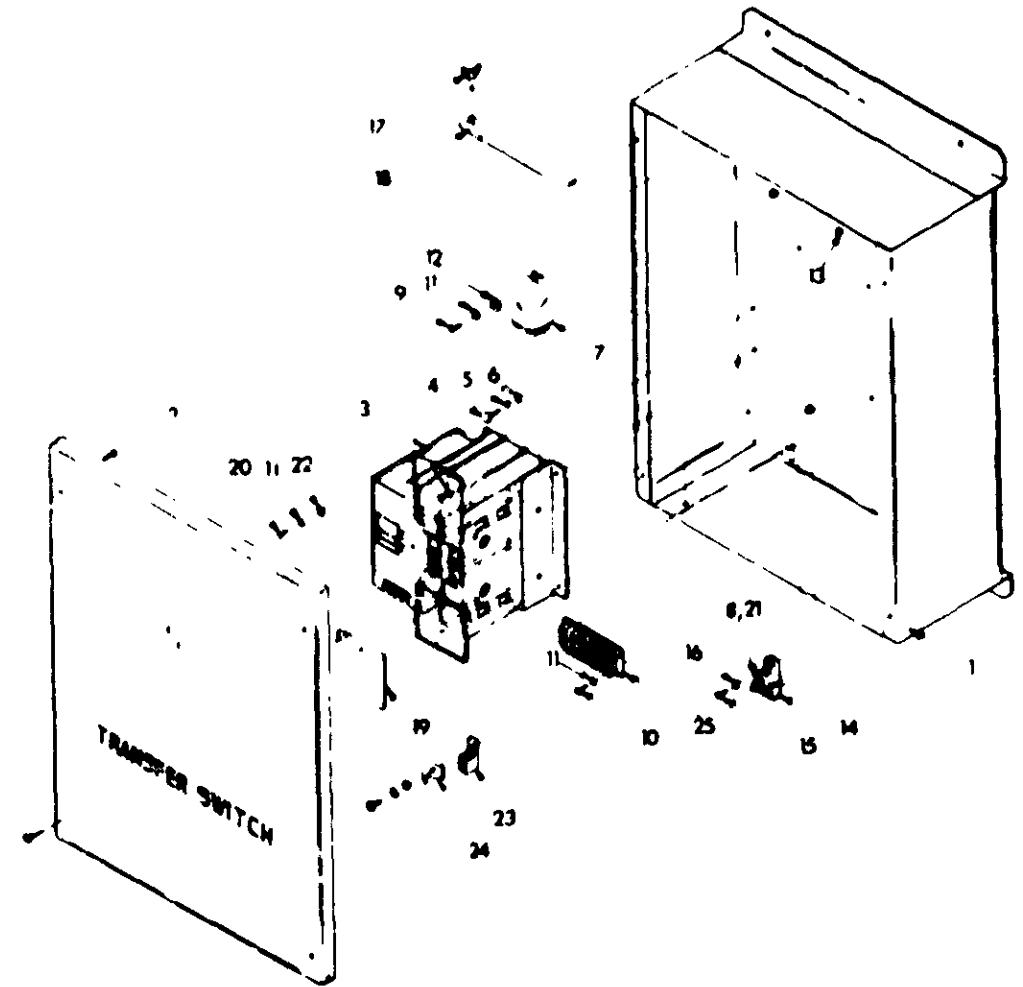


REPAIR PARTS ILLUSTRATION- EXPLODED VIEW OF GENERATOR



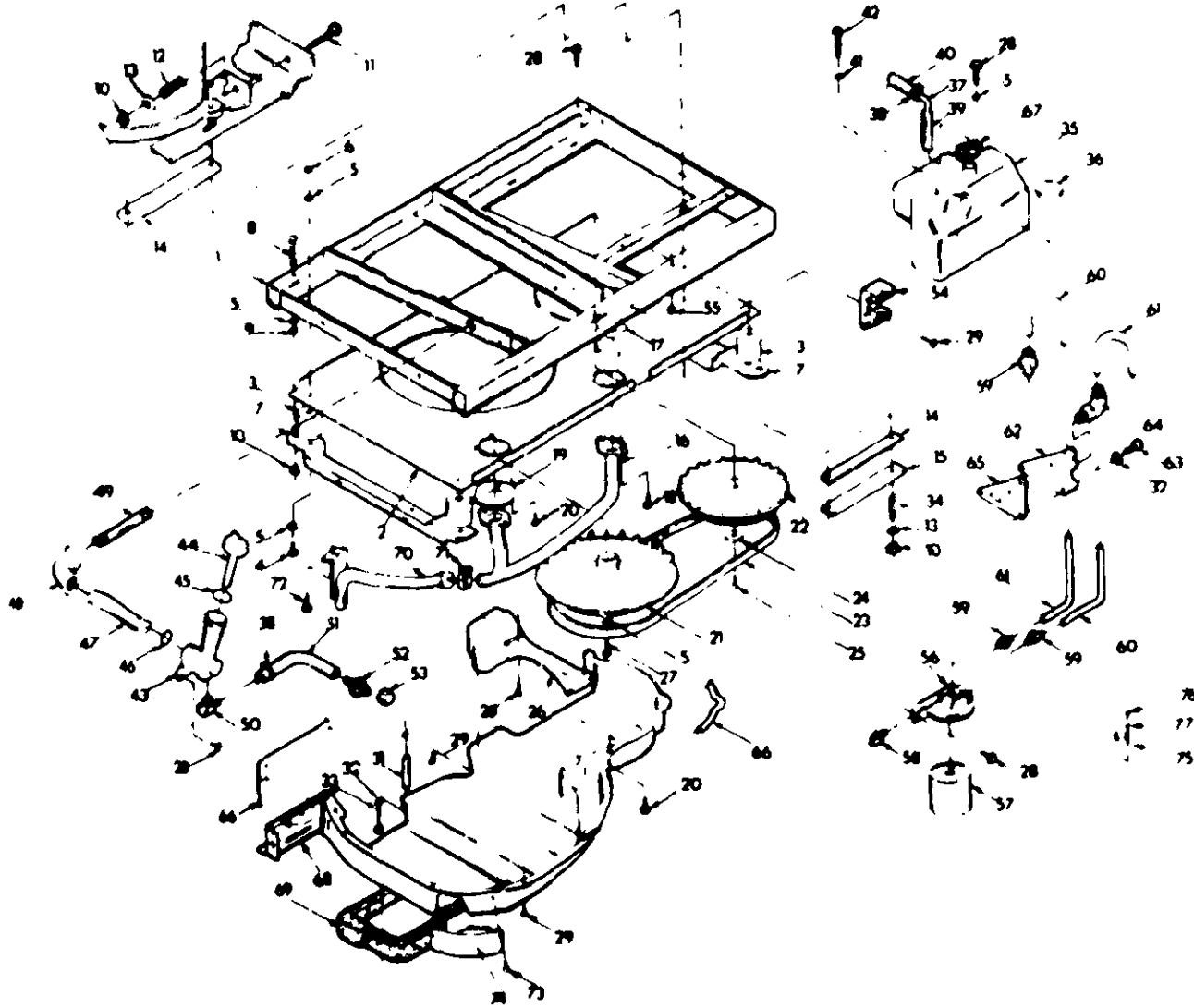
ITEM	PART NO	REQ'D	DESCRIPTION	ITEM	PART NO	REQ'D	DESCRIPTION
1	72378	1	CARRIER Lower Bearing	9	86386	1	HOLDER ASSY Brush
2	73183	1	ROTOR ASSY	10	68649	2	SCREW (Tapite)
3	31971	1	BEARING Ball Lower	11	75203	1	CLAMP Stator Lead
4	73159	1	BEARING Ball Upper	12	74908	1	SCREW (Tapite)
5	73187	1	STATOR ASSY	13	27756	1	WASHER (Non)
6	72379	1	CARRIER Upper Bearing	14	73195	1	COVER Generator Top
7	73146	4	STUD Generator	15	52858	4	NUT Flanged Lock MB-125
8	45771	4	NUT Hex MB-125				

REPAIR PARTS ILLUSTRATION - EXPLODED VIEW OF TRANSFER SWITCH



ITEM	PART NO	REQ'D	DESCRIPTION	ITEM	PART NO	REQ'D	DESCRIPTION
1	74930	1	ENCLOSURE	13	63378	3	TIE WRAP
2	74975	1	COVER Enclosure	14	57073	1	LUG- Neutral
3	64772	1	MECHANISM Transfer 100 amp, 2 Pole	15	33530	2	SCREW Pan Head No 10-32 x 5/8"
4	43118	3	CAPSCREW Hex Head #10-100 x 12mm	16	22152	2	LOCKWASHER- No 10
5	22097	3	LOCKWASHER M8	17	64113	1	STUD, Wing
6	22473	3	FLATWASHER M4	18	63321	1	HANDLE, Transfer
7	63617	1	RELAY Transfer 12 volts d-c 10 amp	19	73662 A	2	SHIELD
8	27628	1	NUT Hex 3/8" 16	20	51676	4	SCREW, Pan Head M4-070 x 12mm
9	36917	2	SCREW Pan Head No 8-32 x 3/8"	21	22131	1	FLATWASHER 3/8"
10	36919	2	SCREW Pan Head No 8-32 x 5/8"	22	22985	4	FLATWASHER- M4
11	22264	8	LOCKWASHER No 8	23	62884	6	LUG, Solderless
12	36150	2	FLATWASHER No 8	24	63552	6	DEVICE, Anti-Rotation
				25	47827	1	BLOCK, Terminal 7-Position

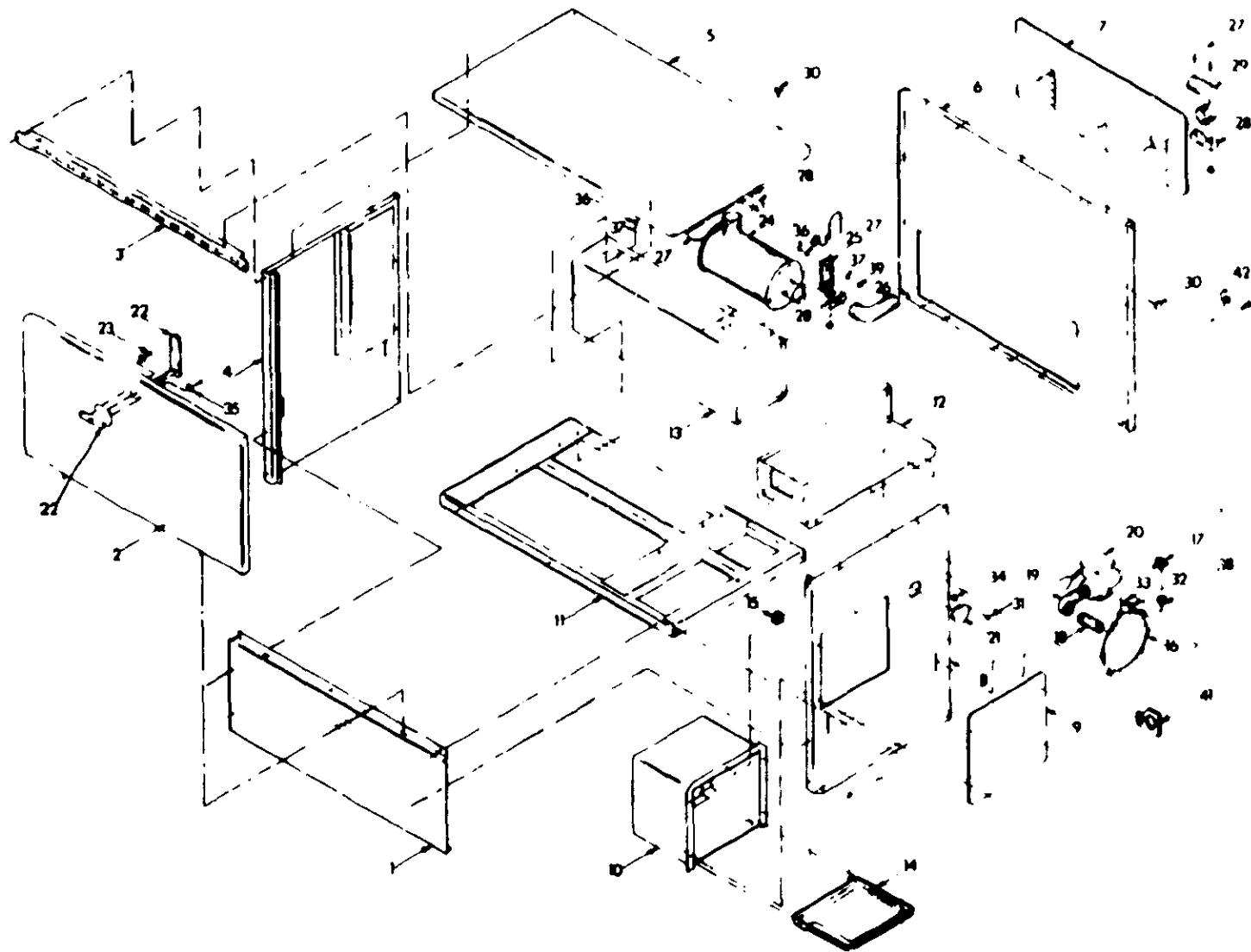
REPAIR PARTS ILLUSTRATION - BASE AND PULLEYS



REPAIR PARTS LIST BASE AND PULLEYS

ITEM	PART NO	REQ'D	DESCRIPTION	ITEM	PART NO.	REQ'D	DESCRIPTION
1	72372	1	BASE, Mounting	39	47662-U	1	HOSE, 3/8" ID x 6" long
2	72382	1	PAN, Collector	40	47662-BG	1	HOSE, 3/8" ID x 25" long
3	38353	4	MOUNT, Rubber	41	50190	1	WASHER, Tank Retainer
4	25017	4	CAPSCREW, Hex Head 3/8" - 16 x 1/2"	42	74913	1	CAPSCREW, Hex Head M6-1 00 x 110mm
5	22237	13	LOCKWASHER- M10	43	73181	1	TUBE, Oil Fill & Drain
6	22241	4	NUT, Hex - 3/8" - 16	44	74958	1	CAP & DIPSTICK ASSY
7	72391	2	SKID, Rubber Mount	45	67871	1	O-RING, Cap
8	73147	2	BOLT, Safety	46	67866	1	O-RING, Drain
9	45771	2	NUT, Hex - M8-1 25	47	73135	1	PIPE, Oil Drain Adapter
10	52658	8	NUT, Flanged Lock M8-1 25	48	73138	1	ELBOW, 90° - 3/8" NPT
11	51730	2	CAPSCREW, Hex Head M8-1 25 x 60mm	49	74936	1	NIPPLE, 3/8" NPT x 2-1/4"
12	29459	2	SPRING, Belt Tensioner	50	43790	1	ELBOW, 3/8" NPT x 3/8"
13	75215	8	WASHER, Spring Center	51	47662-BC	1	HOSE, 3/8" ID x 10-1/2"
14	73146	4	SLIDE, Nylon	52	35461	1	FITTING, Barbed 1/4" NPT x 3/8"
15	75209	2	SUPPORT, Nylon Slide	53	69811	1	CAP, Hex 1/4" NPT
16	73174	1	MANIFOLD, Exhaust	54	69852	1	CLIP, Hose Retainer
17	67897	1	GASKET, Exhaust Manifold	55	52857	1	NUT, Flanged Lock M6-1 00
18	55173	4	CAPSCREW, Hex Head M8-1 25 x 20mm (Gr 10 9)	56	73179	1	SUPPORT, Oil Filter
19	72383	2	COLLECTOR & GASKET	57	70185	1	FILTER, Oil (FRAM PH3614)
20	58892	32	SCREW (Crimpfit) No 10-24 x 3/8"	58	55104	1	SWITCH, Low Oil Pressure
21	75224-D	1	PULLEY, Engine	59	74948	3	FITTING, 5/16"
22	73106-D	1	PULLEY, Generator Fan	60	74950	1	TUBE, Outer Oil
23	75218	1	BELT, Drive- 40" long	61	74951	1	TUBE, Inner Oil
24	73148	1	WASHER, Pulley Retainer	62	73134	1	ADAPTER, Engine Oil Pad
25	73199	1	CAPSCREW, Socket Head 3/8" - 24 x 1-1/4 (Group 8)	63	38750	3	CAPSCREW, Hex Head M6-1 00 x 30mm
26	72381	1	GUIDE, Blower Housing	64	74949	1	FITTING, 90° - 5/16"
27	73118	1	CAPSCREW, Hex Head 3/8" - 24 x 2-1/2" (Group 8)	65	68547	1	GASKET, Oil Pad
28	74908	12	SCREW (Tapfit) M6-1 00 x 20mm	66	29289	1	TAPE, Foam 1/16" thick x 8 feet long
29	74908	9	SCREW (Tapfit) M5-0 80 x 10mm	67	35472	1	CLAMP
30	72375	1	HOUSING, Blower	68	75405	1	COVER, Blower Housing
31	73185	1	SPACER, Blower Housing	69	74998	1	GASKET, Exhaust Air
32	22097	1	LOCKWASHER- M6	70	73176	1	ELBOW, Lower Exhaust
33	74909	1	CAPSCREW, Hex Head M5-0 80 x 70mm	71	74907	1	CLAMP, Exhaust - 1-1/8"
34	75242	4	SPRING, Generator Mount	72	74906	1	CLAMP, Exhaust (Tapfit) M6-1 00 x 20mm
35	74910	1	TANK, Oil Makeup 2-1/2 U.S. quarts	73	58892	4	SCREW (Crimpfit) No 10-24 x 3/8"
36	73156	1	CAP, Oil Makeup Tank	74	72384-B	1	COVER, Lower Exhaust
37	49099	1	ELBOW, Barbed 90°				
38	48031-E	4	CLAMP, Hose- 3/8"				

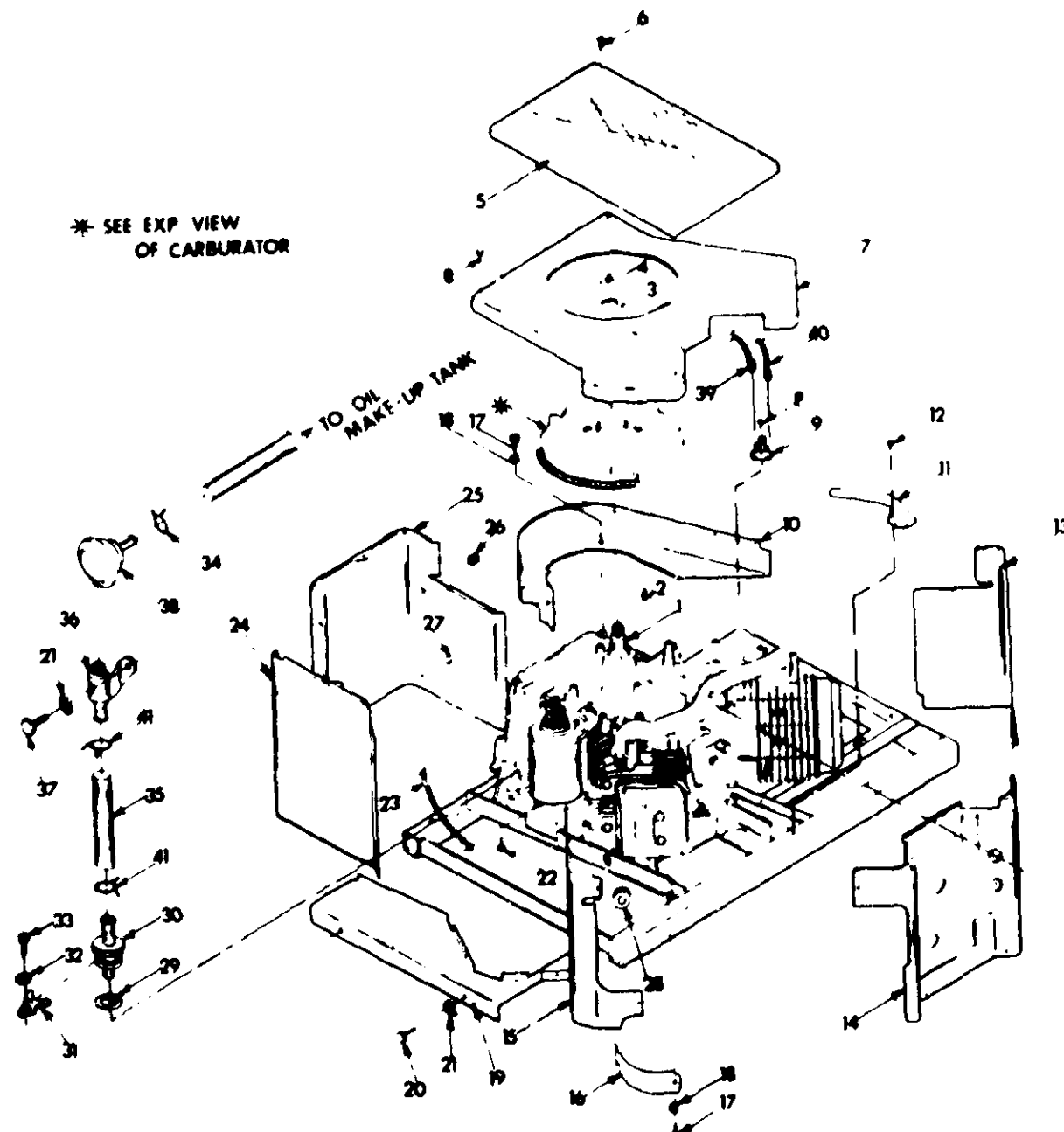
REPAIR PARTS ILLUSTRATION - HOME STANDBY ENCLOSURE



REPAIR PARTS LIST - HOME STANDBY ENCLOSURE

ITEM	PART NO	REQ'D	DESCRIPTION
1	74923	1	RAIL Lower Front
2	74924	1	DOOR ASSY Enclosure
3	74922	1	RAIL Top Front
4	74925	1	PANEL Left Side
5	74928	1	COVER Enclosure Top
6	74927	1	PANEL Rear
7	74996	1	COVER Muffler Box
8	74926	1	PANEL Right Side
9	74931	1	COVER Battery Box
10	74988	1	ENCLOSURE Battery
11	74919	1	FLOOR Enclosure
12	74934-A	1	BOX Control
13	74986	1	BOX Muffler
14	75228	1	TRAY Battery (Plastic)
15	23484 F	1	BUSHING Snap
16	75211	1	REGULATOR Gaseous Fuel
17	75212	1	ADJUSTER Gaseous Fuel (Load Block)
18	26915	1	NIPPLE Pipe 3/4" x 1 3/8"
19	26307	1	ELBOW Street 90° x 3/4"
20	43768 A	1	SOLENOID Gaseous Fuel
21	74997	1	2" UG Cap 2-1/2" diameter
22	67042	1	LATCH RH (#1ML)
23	67035	2	SCREW Pan Head Machine No 8-32 x 5/16"
24	52108	1	MUFFLER Exhaust
25	75407	1	STRAP Exhaust Muffler
26	75411	1	BOX Muffler Outlet
27	28238	3	U-BOLT 1-3/8"
28	28237	3	CLAMP Saddle 1-3/8" diameter
29	75412	1	ELBOW Exhaust Tip
30	75443	53	SCREW (Crimplate) 1/4"-20 x 5/8"
31	22203	2	CAPSCREW Hex Head 1/4"-20 x 1-1/4"
32	22097	2	LOCKWASHER 1/4"
33	22127	2	NUT Hex 1/4"-20
34	22473	2	FLATWASHER 1/4"
35	22264	2	LOCKWASHER No 8
36	22238	3	CAPSCREW Hex Head 3/8"-16 x 1"
37	22237	3	LOCKWASHER 3/8"
38	35468	1	BUSHING Reducer 3/8" x 1/4" NPT
39	27628	1	NUT Hex 3/8"-16
40	22131	1	FLATWASHER 3/8"
41	75413	4	LUG Lifting
42	55414	1	LUG Grounding For 2 thru 8 AWG wire

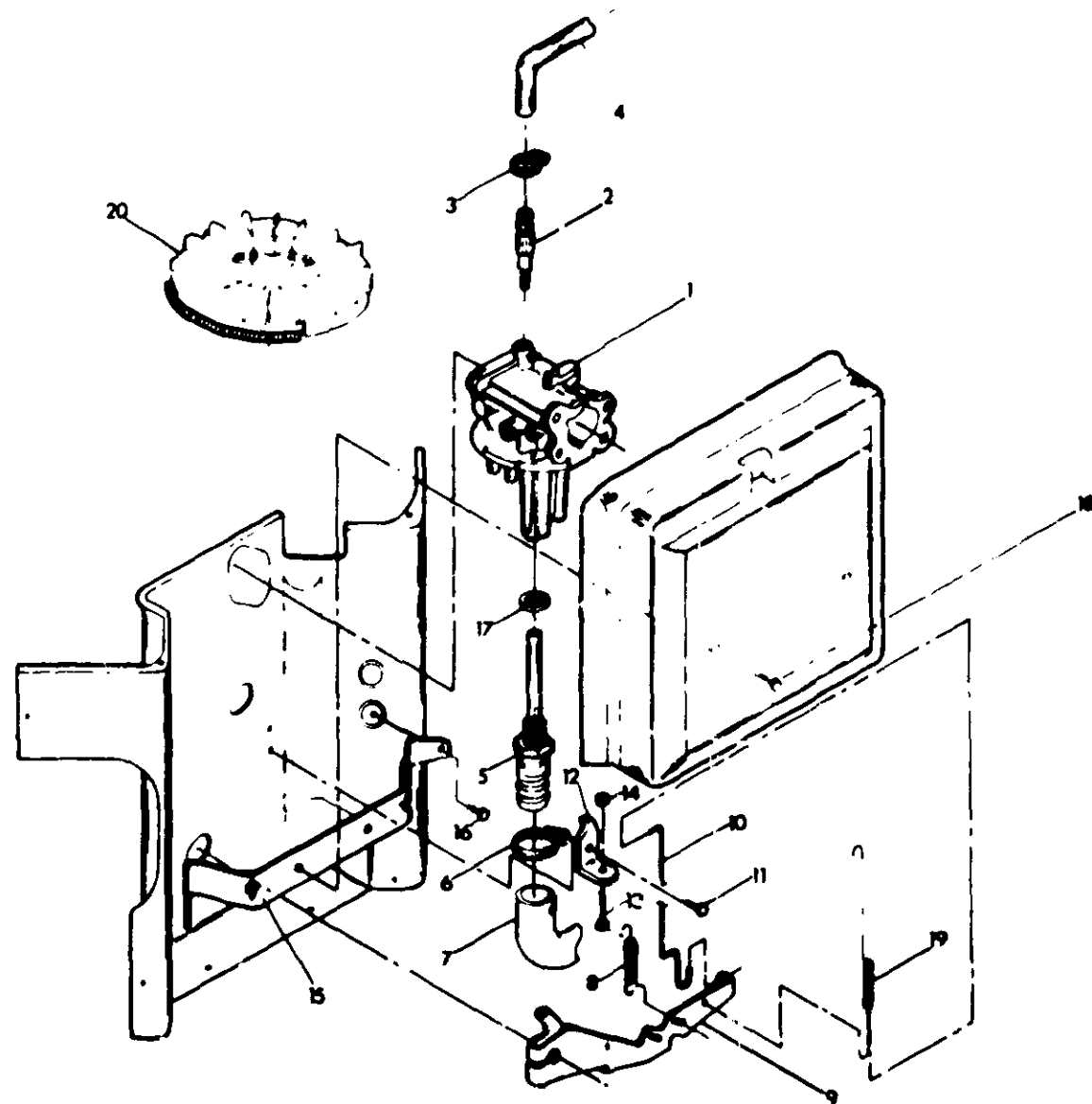
REPAIR PARTS ILLUSTRATION - ENGINE ENCLOSURE



REPAIR PARTS ILLUSTRATION - ENGINE ENCLOSURE

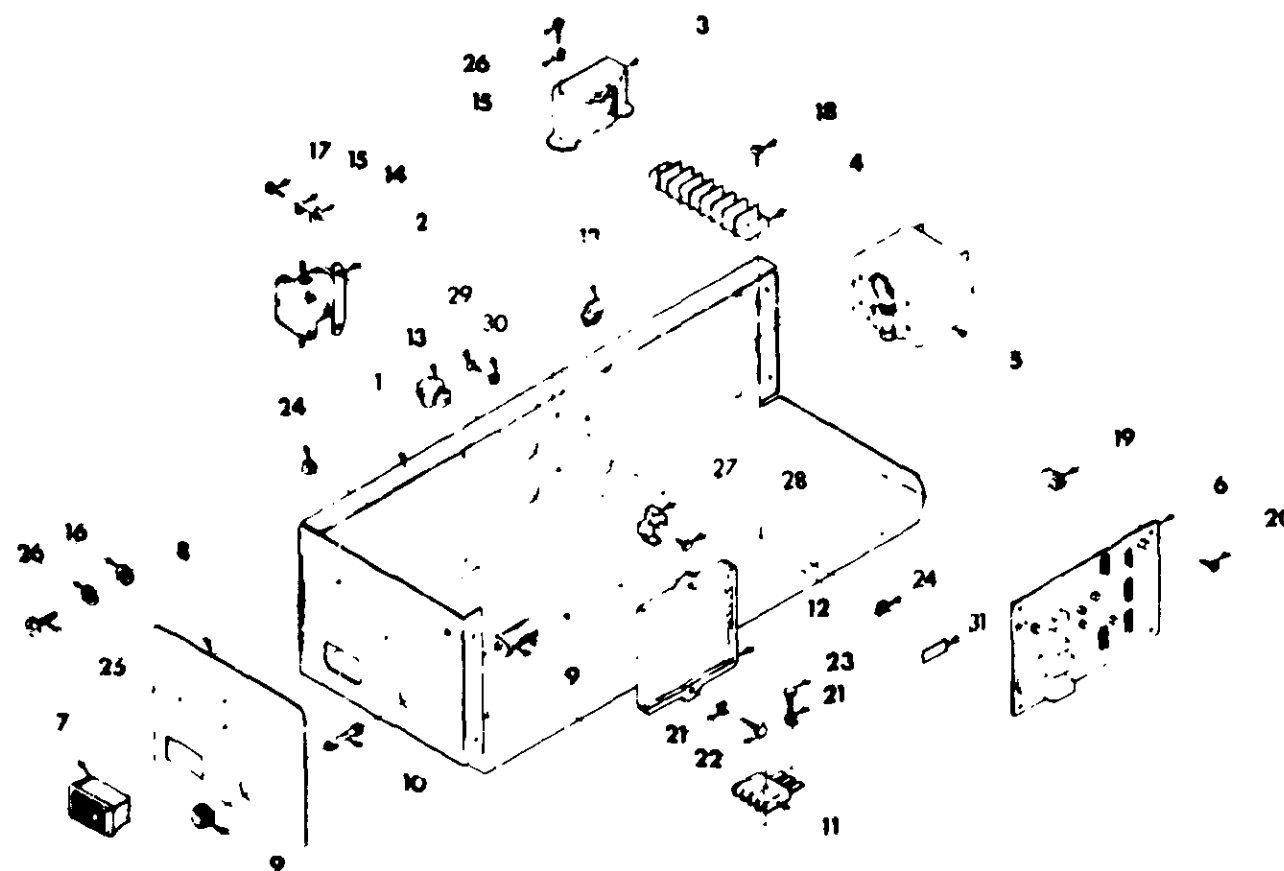
ITEM	PART NO	REQ D	DESCRIPTION
1		1	ENGINE ASSY (See REPLACEMENT PARTS FOR V TWIN ENGINE)
2	67877	1	KEY Woodruff 6 x 25
3	67198-N	1	WASHER Belleville
4	67890	1	NUT Hex M20 1 50
5	74915	1	SCREEN Air Inlet
6	63036	6	SCREW (Crimptite) No 8-32 x 1/4"
7	74904	1	HOUSING Engine Top
8	56892	22	SCREW (Crimptite) No 10-32 x 3/8"
9	70520	1	MODULIF Shorting
10	74903	1	SCROLL Flywheel
11	74916	1	COVER Base #2
12	74908	8	SCREW (Tapfit) M5 x 10mm
13	73190	1	WRAPPER No 2 Cylinder
14	73189	1	COVER Valley
15	73188	1	WRAPPER No 1 Cylinder
16	74902	2	WRAPPER Barrel
17	43176	4	CAPSCREW Hex Head M6 1 00 x 10mm
18	22097	4	LOCKWASHER M6
19	73191	1	COVER Base No 1 Cylinder
20	48571	2	CAPSCREW Hex Head M8-1 25 x 10mm
21	22129	2	LOCKWASHER M8
22	75246	4	SCREW (Tapfit) 3/8" 16 x 1 1/4"
23	11 47260	1	WIRE ASSY No 16
24	74900	1	COVER Starter
25	73186	1	WRAPPER Crankcase
26	23484 D	1	BUSHING Snap
27	22717-B	1	GROMMET Rubber
28	22717 A	2	GROMMET Rubber
29	67866	1	O RING
30	74955	1	PROBE Oil Makeup
31	74965	1	RETAINER Oil Makeup Probe
32	22447	1	WASHER (Shakeproof) M6
33	40936	1	SCREW Socket Head M6 1 00 x 8mm
34	48031 E	1	CLAMP Hose
35	47662-BB	1	HOSE 5/16" ID
36	74956	1	BRACKET Oil Makeup Pump
37	42907	1	CAPSCREW Hex Head M8-1 25 x 16mm
38	46509	1	PUMP Oil Makeup
39	08-74260	1	WIRE ASSY (Ground) 5-1/2" long
40	09-74260	1	WIRE ASSY (Ground) 15" long
41	48031-D	2	CLAMP Hose

REPAIR PARTS ILLUSTRATION - NATURAL GAS CARBURETOR



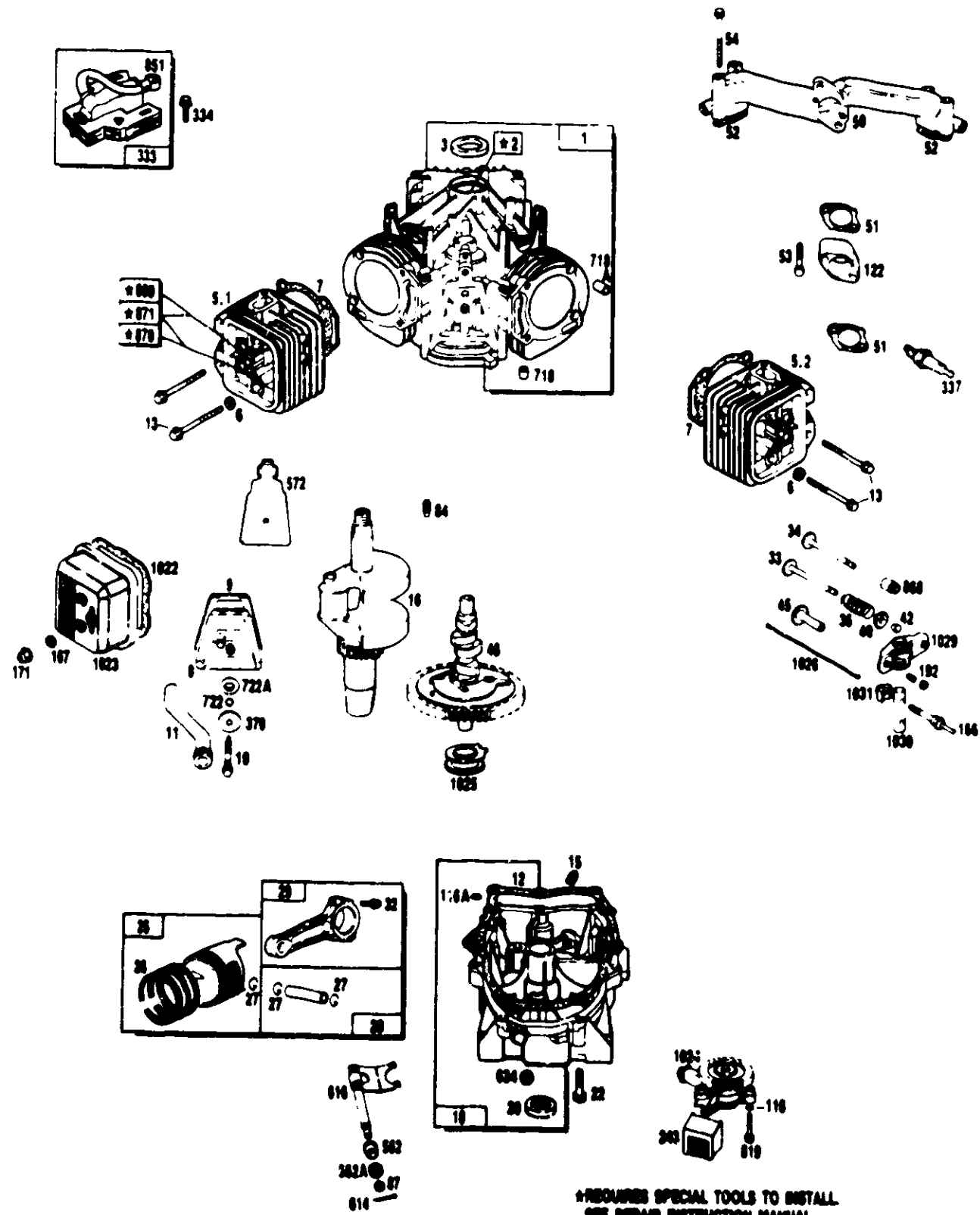
ITEM	PART NO.	REQ'D	DESCRIPTION	ITEM	PART NO.	REQ'D	DESCRIPTION
1	74953	1	CARBURETOR ASSY	11	54892	1	SCREW (Crimp/Flt) No 10-32 x 3/8"
2	75233	1	FITTING, Idle Fuel	12	74981	1	BRACKET, Governor Adj
3	40173	1	CLAMP, Hose	13	47227	1	SCREW, Governor Adj
4	74995-A	1	HOSE- 1/4" ID x 34"	14	37398	1	NUT, Lock
5	74986	1	TUBE, Inlet Fuel	15	73131	1	BRACKET, Air Cleaner
6	57822	1	CLAMP, Hose	16	66476	2	SCREW, Hex- M6-1 00
7	74994-A	1	HOSE- 1/2" ID x 32"	17	74989	1	WASHER, Gasket
8	74982-A	1	SPRING, Governor- Red	18	72310	2	SCREW, Hex M6-1 00 x 25mm
9		1	LEVER, Governor	19	7-125	1	SPRING, Anti-Lash
10	70108	1	ROD, Governor to Carb	20	73114-A	1	FLYWHEEL ASSY

REPAIR PARTS ILLUSTRATION - CONTROL PANEL



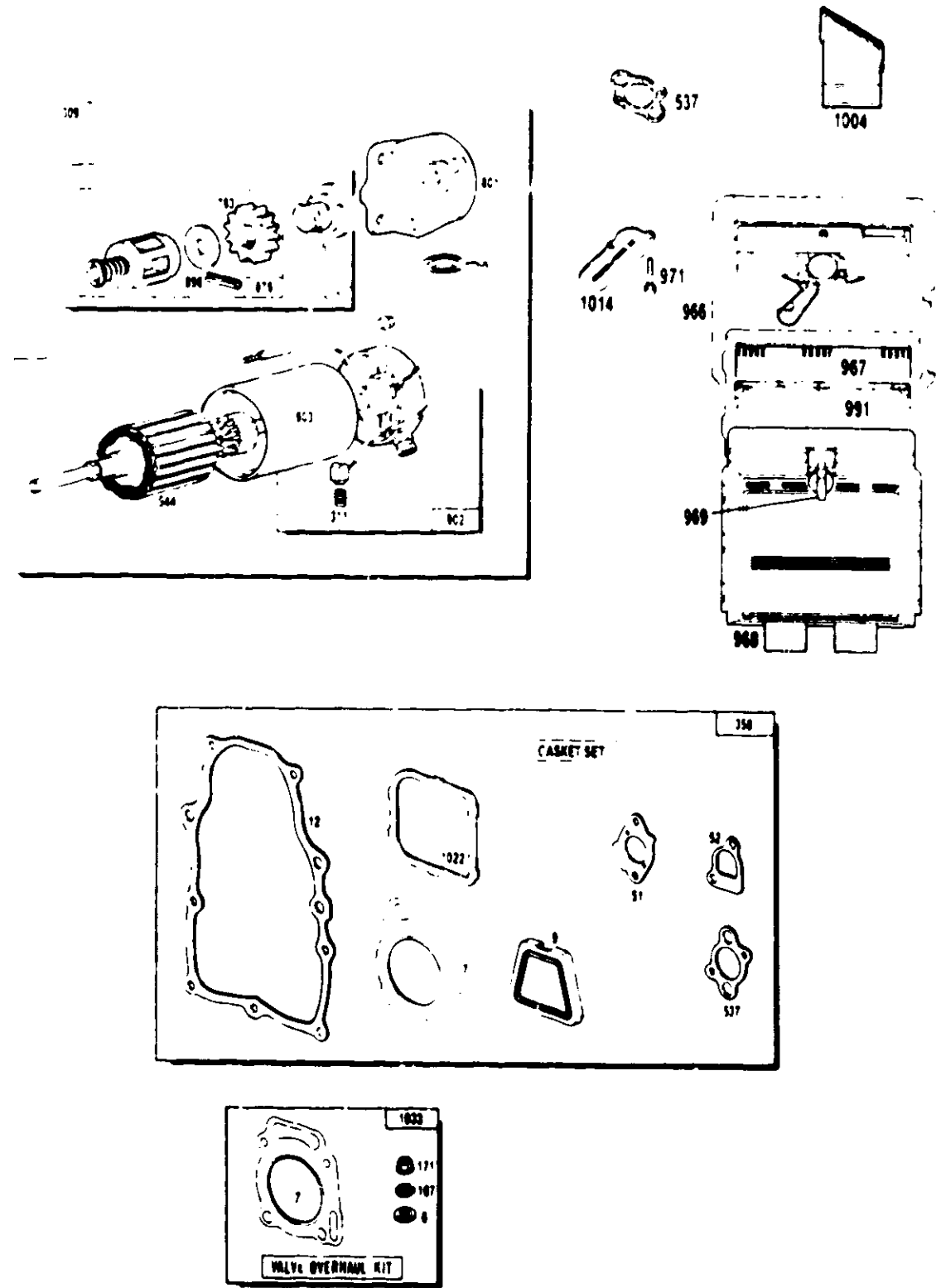
ITEM	PART NO.	REQ'D	DESCRIPTION	ITEM	PART NO.	REQ'D	DESCRIPTION
1	74934	1	BOX Connection	17	43146	2	CAPSCREW- M6-1 00 x 10mm
2	56739	1	SOLENOID, Control 12 volts d-c	18	75476	2	SCREW, Pan Head- M4-0 70 x 16mm
3	74935	1	TRANSFORMER	19	72566	4	NUT Circuit Board Spacer
4	47822	1	BLOCK Terminal	20	72509	4	SCREW Self Tapping- M4 x 12mm
5	74989	1	BREAKER Circuit 35 amp	21	49226	3	LOCKWASHER- M5
6	74100	1	BOARD Circuit	22	71235	2	CAPSCREW- M5-0 80 x 30mm
7	33873	1	SWITCH Manual/Off/Auto	23	49815	1	CAPSCREW- M5-0 80 x 16mm
8	75417	1	DECAL Control Panel	24	51716	3	NUT, Hex M5-0 80
9	32300	1	HOLDER Fuse	25	36917	4	SCREW- No 6-32 x 3/8"
10	22678	1	FUSE 15 amp	26	75475	2	SCREW Pan Head- M4 0 70 x 10mm
11	65796	1	RECTIFIER Battery Charge	27	51345	1	LUG- 4 tabs
12	74074	1	REGULATOR Voltage	28	63036	1	SCREW- No 6-18 x 1/4"
13	22206	2	CONNECTOR Conduit	29	75477	1	SCREW, Pan Head- M5 0 80 x 20mm
14	22473	2	FLATWASHER- M6	30	22760	1	LOCKWASHER- No 10
15	22097	2	LOCKWASHER- M6	31	40496	1	DECAL- Neutral
16	22264	4	LOCKWASHER- M4				

EXPLODED VIEW OF V-TWIN ENGINE



*REQUIRES SPECIAL TOOLS TO INSTALL
SEE REPAIR INSTRUCTION MANUAL

EXPLODED VIEW OF V-TWIN ENGINE



EXPLODED VIEW OF V-TWIN ENGINE

ITEM	PART NO.	REQ'D	DESCRIPTION	ITEM	PART NO.	REQ'D	DESCRIPTION
1	69331	1	CYLINDER ASSY	333	67891	1	IGNITION ARMATURE ASSY
2	69333	1	SLEEVE BEARING- 30 DIA	334	72356	2	SCREW, Ignition Armature
3	67805	1	OIL SEAL- 30 DIA	337	72347	2	SPARK PLUG- Champion R12YC
5 1	69311	1	CYLINDER HEAD ASSY- No 1	358	75258	1	GASKET KIT- Engine
5 2	69312	1	CYLINDER HEAD ASSY- No 2	370	75259	1	WASHER, Breather Screw
6	70169	4	SEALING WASHER	510	75260	1	STARTER DRIVE ASSY
7	69332	2	GASKET- Cylinder Head	513	75261	1	CLUTCH ASSY
8	72301	1	BREATHER ASSY	537	66480	1	GASKET, Air Cleaner
9	72315	1	GASKET Breather	544	75269	1	ARMATURE ASSY
10	70190	1	SCREW, Breather	552	72361	1	BUSHING, Governor Shaft
11	70596	1	TUBE, Breather	552A	72362	1	BUSHING Governor Shaft
12	69336	1	GASKET, Oil Sump	572	70199	1	BAFFLE, Breather
13	69325	8	BOLT, Cylinder Head	614	72366	1	COTTER PIN
15	67888	2	PLUG, Oil Drain- 3/8" NPT	616	72367	1	GOVERNOR FORK
16	72334	1	CRANKSHAFT ASSY	634	72365	1	WASHER, Governor Shaft
18	75247	1	OIL SUMP ASSY	718	68555	2	DOWEL, Crankcase
20	67924	1	OIL SEAL 35 DIA	718A	67816	4	DOWEL Cylinder Head
22	67878	9	BOLT, Oil Sump	722	75252	1	SEAL Breather Screw
25	75248	2	PISTON ASSY- STD	722A	75263	1	SEAL Breather Screw
26	75249	2	RING SET, Piston- STD	783	75264	1	STARTER GEAR
27	69327	4	LOCKING RING, Piston	801	75265	1	STARTER END CAP ASSY
28	75250	2	PISTON PIN- STD	802	75266	1	COMMUTATOR CAP ASSY
29	75251	2	CONNECTING ROD ASSY	803	75267	1	STARTER HOUSING ASSY
32	72346	4	BOLT, Connecting Rod	819	68572	2	SCREW, Oil Pump
33	69316	2	EXHAUST VALVE	851	75272	2	TERMINAL, Spark Plug
34	69317	2	INTAKE VALVE	868	70122	2	SEAL, Valve Stem
35	67816	4	VALVE SPRING	869	67910	2	SEAT, Intake Valve
40	69320	4	RETAINER, Valve Spring	870	67911	2	SEAT, Exhaust Valve
42	70513	4	KEEPER, Valve	871	67813	4	VALVE GUIDE
45	70584	4	TAPPET, Valve	876	75268	1	RETAINER AND PIN
46	70530	1	CAMSHAFT ASSY	896	75270	1	ROLL PIN
50	72358	1	INTAKE MANIFOLD	966	70592	1	AIR CLEANER BASE
51	69379	2	GASKET, Carburetor Mounting	967	73123	1	AIR FILTER (Flame Retardant)
52	67895	2	GASKET, Intake Manifold	968	70593	1	COVER, Air Cleaner
53	70594	2	BOLT, Carburetor Mount	969	72300	1	SCREW- Air Cleaner Cover
54	67158	4	BOLT, Intake Manifold Mount	971	67158	2	SCREW- Air Cleaner Base
84	68574	1	PIPE PLUG- 1/8" NPT	991	69341	1	PRE-FILTER
87	68554	1	SEAL, Governor Shaft	1004	70597	1	TUBE- Air Inlet
116	68573	1	O-RING, Oil Pump	1014	69358	1	DEFLECTOR- Breather
116A	70606	1	O-RING, Oil Galley	1022	67920	2	GASKET- Valve Cover
122	70654	1	SPACER, Carburetor	1023	69328	2	VALVE COVER
166	70568	4	STUD, Rocker Arm	1024	70547	1	OIL PUMP ASSY
167	75253	4	SEAL WASHER- Valve Cover	1025	70536	1	GOVERNOR SLIDER
171	67885	4	NUT, NyLok- M6	1028	70577	4	PUSH ROD
192	75254	4	SCREW, Valve Adjust	1029	70599	4	ROCKER ARM ASSY
243	70535	1	SCREEN Oil	1030	70567	2	SHAFT- Rocker Arm
309	75255	1	STARTER MOTOR	1031	70566	4	SUPPORT- Rocker Arm
310	75256	2	BOLT, Starter Motor	1033	75271	1	KIT- Valve Overhaul
311	75257	4	BRUSH ASSY				

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**

**THIS PAGE
INTENTIONALLY LEFT
BLANK**